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URBANA

REPORT OF INVESTIGATIONS—NO. 147

ILLINOIS MINERAL INDUSTRY IN 1948

BY

WALTER H. VOSKUIL

PRINTED BY AUTHORITY OF THE STATE OF ILLINOIS

URBANA, ILLINOIS

1950

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Topographic Mapping in Cooperation with the United States Geological Survey.

This report is a contribution of the Mineral Economics Section.

November 1, 1949

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ILLINOIS MINERAL INDUSTRY IN 1948

BY

WALTER H. VOSKUIL

MAN AND MINERALS

IT IS A CONCEPT of long standing in the study of man's economic behavior that his wants are considerably beyond his present means of satisfying them. People need food and clothing and shelter, but do not limit their wants to these elemental necessities. The need for food is accompanied by a want for better food, a wider variety of choice, a more ample supply. This type of expanding want is also true of housing and clothing. But man does not stop there. He likes to travel—luxuriously perhaps; he seeks amusements, education, cultural enjoyments; he will spend a great deal of money in caring for his health, or in restoring it if it is impaired. Man wants much and can satisfy these wants only upon condition that he can produce in abundance and in a wide variety of means; and he soon learns that the use of his hands and muscles alone yields only a small return.

Now production is entirely a matter of controlling the physical environment. Production means shifting things about, mixing them, heating them, cutting them, covering them with other stuff that has been shifted about, and so on, and then exchanging them for other things that in their turn have been shifted about, too.

Let us think for a moment of our predecessors. With an immense amount of hand labor they built irrigation projects, terraced hillsides, or changed the courses of rivers to find a water supply, and developed around their projects a highly organized human society, only to find their technological environment too difficult to manage, and so to see their society decay. There were two reasons for this: first, their motive power was almost entirely unaided human effort, usually the labor of slaves; second, they did not have, in all the evidence before us, that knowledge of the properties and behavior of nature that we call science; in particular they did not seem to know how to convert thermal into kinetic energy. To us it seems a miracle that any large society could have survived without a knowledge of heat engines. It was not until the use of metals and fuels became common that one modern engine could do the work of a thousand laborers of ancient Egypt.

Man needs, in addition to fuel and the metals, also the material, in large quantities, not only to make the things he uses directly, but also to build the housing and machines within which and by means of which his many wants are provided. It is here that earth materials, the metals and minerals and fossil fuels imbedded in or otherwise locked in the earth's crust, provide the source materials which, when effectively used, can be the means of making his hands and his intellect highly productive.

Until he learned how to use them, man was virtually limited to feeding and clothing himself. It was only when he learned the properties of minerals, and how these could be turned to his advantage in his efforts to produce things, that man learned not only to produce food needs more easily and abundantly, but had plenty of time and energy available for producing other things besides food.

The vast tonnage of minerals used is indicative of the role that minerals play in the operation of a productive society. In the United States minerals account for 50 percent of railroad car loadings and, if the products made from minerals are included, the tonnage easily rises to 75 percent.

An economy based upon the effective use of minerals has given the mineral-endowed peoples of the globe not only adequate food

Line No.	Material	Detail table	Unit	1946				
				Quantity	Value at plants		Rank among states	
					Total	Av.	Amt.	Val.
1	*Coal—bituminous*	13	Tons	63,767,000	$166,432,000	$2.61	4	4
	Petroleum							
2	Crude oil	26	Bbls.	75,297,000	*119,722,000	1.59	6	6
3	Natural gas—marketed	—	M. cu. ft.	(b)	(b)	—		
4	Natural gas—used in fields	—	M. cu. ft.	(b)	(b)	—		
5	Natural gasoline	—	Gals.	53,612,000	2,895,000	.054	7	6
6	Liquefied petroleum gases	—	"	108,334,000	3,358,000	.031	5	4
7				—	*125,975,000	—		
	Stone, rock products							
8	Limestone, dolomite, marl	32, 33	Tons	16,199,882	17,512,579	1.08	3	3
9	Cement	36	Bbls.	7,069,779	12,421,968	1.76	e*12	e10
10	Lime	37	Tons	280,051	2,365,455	8.45	*7	*6
11	Ganister, sandstone	38	"	8,336	10,900	1.30		
12				—	32,310,902	—		
	Clays, clay products							
13	Clays (except fuller's earth)	39	Tons	173,172	583,209	3.37	* 3	
14	Fuller's earth	39	"	33,134	296,637	8.95	4	4
15	Clay products—refractories	40	"	208,802	5,170,788	24.81		
16	Structural	40	Eqv. tons	1,752,428	14,752,254	8.42		3
17	Whiteware and pottery	40	—	—	12,274,324	—		
18				—	33,077,212	—		
	Sand and Gravel							
19	Silica sand	41	Tons	2,256,503	3,407,547	1.51	1	1
20	Other sand	42	"	4,830,604	2,851,548	.59		
21	Gravel	42	"	10,259,669	5,809,757	.57		
22				17,346,776	12,068,852	.70	2	2
	Silica and tripoli							
23	Ground silica	43	Tons	138,023	1,002,836	7.27	1	1
24	Tripoli ("amorphous" silica)	44	"	15,631	321,600	20.57	1	1
25				153,654	1,324,436	8.62	1	1
26	*Fluorspar*	47	Tons	154,525	5,493,642	35.55	1	1
	Metals							
27	Zinc	51	Tons	8,798	2,146,712	244.00	17	17
28	Lead	51	"	3,865	842,570	218.00	13	13
29	Silver	51	Troy oz.	2,302	1,860	0.808	19	19
30				—	2,991,142	—		
31	*Annual mineral production*			—	379,673,186	—		
	Minerals processed, but mostly not mined, in Illinois							
32	Coke produced and by-products sold	20, 52	—	—	* 40,443,313	—		6
33	Packaged fuel	—	Tons	* 1,454	* 23,814	*16.38		
34	Pig iron produced	52	"	* 4,357,310	*117,647,370	*27.00	4	4
35	Slab zinc	52	"	* 104,002	* 25,376,488	244.00	4	4
36	*Total minerals processed*			—	*183,490,985	—		
37	*Total minerals produced and processed*			—	*$563,164,171	—		

* Revised figures.
[a] Compiled from various sources, as stated in each table. See footnotes for each table.
[b] Not available.
[c] Estimated.
[d] Subject to revision.
[e] Rank among districts.

ILLINOIS, SOLD OR USED BY PRODUCERS, 1946–1948[a]

1947*					1948[d]					Line No.
Quantity	Value at plants		Rank among states		Quantity	Value at plants		Percent change in amount from 1947	Percent change in value from 1947	
	Total	Av.	Amt.	Val.		Total	Av.			
68,325,000	$215,224,000	$3.15	4	4	66,167,000	$242,171,000	$3.66	− 3.2	+ 12.5	1
66,459,000	139,564,000	2.10	6	6	64,669,000	179,133,000	2.77	− 2.7	+ 28.3	2
(b)	(b)	—			(b)	(b)	—			3
(b)	(b)	—			(b)	(b)	—			4
[c] 47,455,000	[c]2,562,570	.054			[c]148,995,000	[c]9,684,675	[c].065	− 8.5	+ 49.3	5
[c]115,468,000	[c]3,925,912	.034								6
—	146,052,482	—			—	188,817,675	—	—	+ 29.3	7
15,786,379	18,424,089	1.17			18,593,042	23,379,762	1.26	+ 17.8	+ 26.9	8
7,155,000	13,219,000	1.85			7,574,000	15,201,000	2.01	+ 5.9	+ 15.0	9
299,187	2,736,262	9.15			285,706	3,013,971	10.55	— 4.5	+ 10.1	10
16,299	18,757	1.15			200	1,000	5.00	—	—	11
—	34,398,108	—			—	41,595,733	—	—	+ 20.9	12
201,025	613,265	3.05			261,205	1,293,385	4.95	+ 9.4	+ 29.1	13
37,746	388,955	10.31								14
253,408	7,074,774	27.92			262,871	8,281,469	31.50	+ 3.7	+ 17.0	15
1,475,779	12,806,298	8.68			1,780,904	17,200,539	9.66	+ 20.7	+ 34.3	16
—	12,859,663	—			—	17,924,175	—	—	+ 32.6	17
—	33,742,955	—			—	44,699,568	—	—	+ 32.5	18
2,533,773	4,351,243	1.72			2,504,528	4,795,569	1.91	− 1.2	+ 10.2	19
4,535,616	3,110,206	.69			5,738,402	4,133,668	.72	+ 26.5	+ 32.9	20
8,275,141	4,818,399	.58			9,353,275	6,059,445	.65	+ 13.0	+ 25.8	21
15,344,530	12,279,848	.80			17,596,205	14,988,682	.85	+ 14.7	+ 22.0	22
189,256	1,457,631	7.70			222,827	1,864,585	8.37	+ 17.7	+ 27.9	23
14,687	314,075	21.38			(b)	(b)	—	—	—	24
203,943	1,771,706	8.67			222,827	1,864,585	8.37	+ 17.7	+ 27.9	25
167,157	6,148,654	36.78	1	1	172,561	6,322,246	36.64	+ 3.2	+ 2.0	26
10,073	2,437,666	242.00	17	17	12,980	3,452,680	266.00	+ 28.9	+ 41.6	27
2,325	669,600	288.00			3,695	1,322,810	358.00	+ 58.9	+ 97.6	28
1,790	1,620	0.905			4,047	3,663	0.905	+126.1	+126.1	29
—	3,108,886	—			—	4,779,153	—	—	+ 53.7	30
—	452,726,639	—			—	545,238,642	—	—	—	31
—	59,908,055	—		5	—	66,229,015	—	—	+ 10.5	32
(b)	(b)	—			(b)	(b)	—	—	—	33
5,600,152	196,005,320	35.00	4	4	5,512,783	231,536,886	42.00	− 1.6	+ 18.1	34
113,192	27,392,464	242.00	4	4	93,229	24,798,914	266.00	− 17.6	− 9.5	35
—	283,305,839	—			—	322,564,815	—	—	+ 13.8	36
—	$736,032,478	—			—	$867,803,457	—	—	—	37

TABLE 2.—VALUE OF ILLINOIS MINERAL PRODUCTION, 1914–1948[a]
(In thousands of dollars)

Year	Mineral production of Illinois (thousands)	Minerals processed, but mostly not mined, in Illinois (thousands)	Total minerals produced and processed (thousands)
1914	$117,166	$ 44,843	$162,009
15	114,446	82,871	197,317
1916	146,360	130,082	276,442
17	234,736	144,754	379,490
18	271,244	149,740	420,984
19	213,701	95,077	308,778
20	373,926	137,228	511,154
1921	254,019	54,136	308,155
22	244,618	85,820	330,438
23	282,761	142,131	424,892
24	235,796	95,506	331,302
25	231,658	118,702	350,360
1926	237,242	119,642	356,884
27	180,394	105,099	285,493
28	188,099	110,622	298,721
29	182,791	125,516	308,307
30	148,311	89,303	237,614
1931	108,066	52,014	160,080
32	71,693	24,385	96,078
33	74,837	34,786	109,623
34	89,212	41,405	130,617
35	96,484	57,038	153,522
1936	117,916	78,693	196,609
37	133,437	104,359	237,796
38	130,155	50,482	180,637
39	215,157	86,324	301,481
40	287,327	114,814	402,141
1941	333,225	168,338	501,563
42	341,835	199,281	541,116
43	337,912	221,939	559,851
44	342,832	206,833	549,666
45	344,267	193,658	537,925
1946	*379,673	*183,491	*563,164
47	*452,727	*283,305	*736,032
48	545,239	297,766	843,005

* Revised figures.

[a] Compiled from following sources:

For years 1914-1922, Incl.—U. S. Geological Survey, Mineral Resources of United States.
1923-1931, " —U. S. Bureau of Mines, Mineral Resources of United States.
1932-1938, " —U. S. Bureau of Mines, Minerals Yearbooks.
1939-1948, " —Summary of canvass made by Illinois Geological Survey and U. S. Bureau of Mines, and from Minerals Yearbooks.

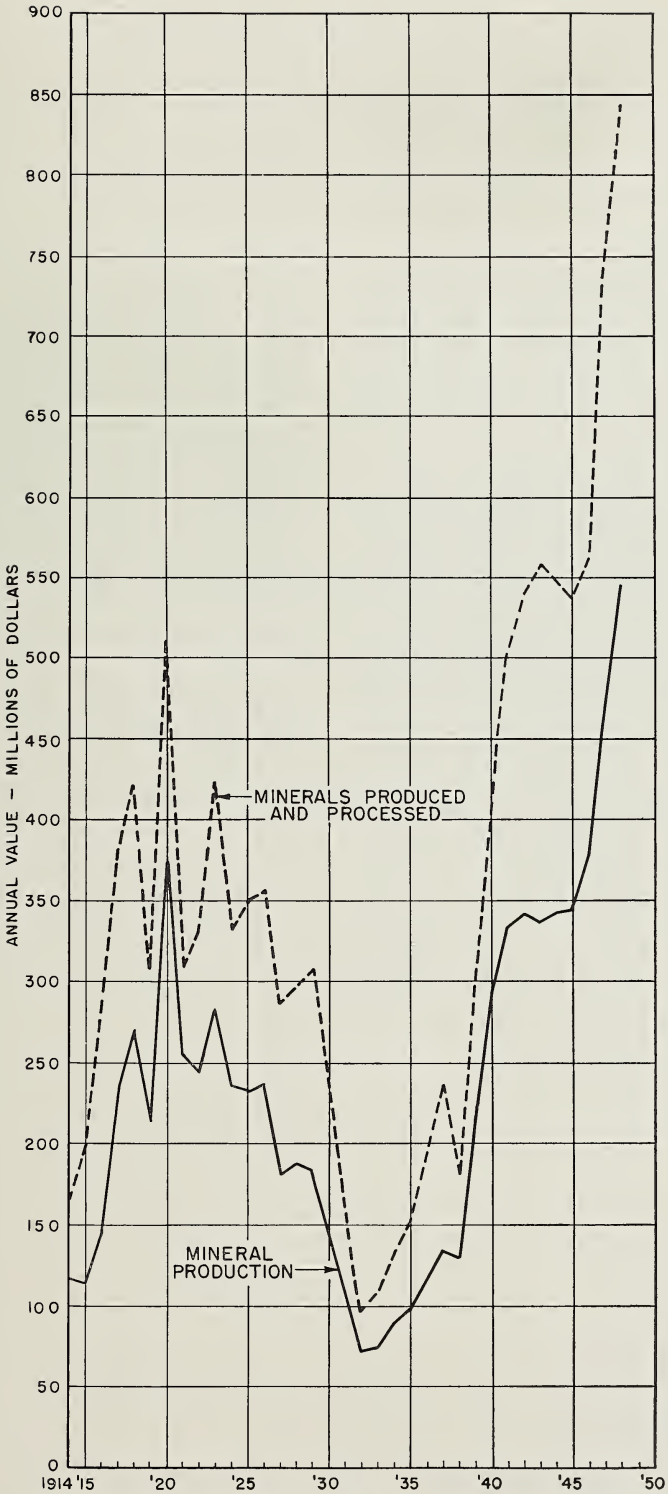

FIG. 1.—Value of annual mineral production in Illinois, 1914-1948.

and clothing, but also a wide range of material comforts, education, medical services, cultural advantages, and leisure.

The wide variety of mineral production in the State and the high rank of Illinois among the states in the production of several of these minerals, as shown in table 1, indicate the State's important position as a mineral producer.

Not only is Illinois an important producer of minerals, but it also ranks high as a center for the processing of mineral raw materials into primary raw materials for the use of industry. This is shown in tables 1 and 2, and figure 1.

Acknowledgments

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COAL

Coal in 1948

Coal production in 1948 reflects the high level of industrial activity in the post-war period. Output in that year was 594 million tons. Although this is a 6 percent decrease from 1947, it is higher than all the war years except 1944. Also, the change in 1948 from 1947 is brought about largely through the decrease of coal exports, which dropped from 69 million tons in 1947 to 46 million tons in 1948.

The National Picture

Production of coal as shown in table 3 was 594 million tons, a drop of 6 percent below the all-time high level of 631 million tons in 1947. National output of coal, by states for the years 1944 to 1948, is shown in table 4.

Production by Districts

Coal production by districts is shown in table 5 for three years. Of particular interest are districts east of the Mississippi River which produce more than 90 percent of bituminous coal output.

Although competition among producing districts in price areas is keen, there is a certain degree of market specialization among the several districts, based mainly on the characteristics of the product.

Districts 2, 7, and 8 (fig. 2) supply coking coal for the blast furnaces and also a high percentage of fuel used for domestic heating. These two markets are, in a sense, complementary. Coal suitable for coking is also excellent for domestic fuel. The small sizes and screenings are therefore absorbed by the coking coal market and the prepared sizes find a ready outlet for domestic fuel over a large area.

Districts 3, 4, 6, and 9 (fig. 2) market one-third or more of their output as railroad fuel, whereas the remaining districts distribute their output among manufacturing industries, utilities, railroads, and retail yards.

Upper Mississippi Valley

The Upper Mississippi Valley coal market area includes Illinois, Indiana, Wisconsin, Minnesota, Iowa, Missouri, the eastern Dakotas, and Kansas.

In this area is marketed coal from the Eastern Interior coal field in the states of Illinois, Indiana, and western Kentucky, and coal from the Appalachian districts of Pennsylvania, West Virginia, eastern Kentucky, and Ohio. Coal is distributed by rail, rail-lake, rail-river, and truck. The coal requirements of the Upper Mississippi Valley include fuel for domestic heating, fuel for general industrial purposes, fuel for rail transporation, and coal for the manufacture of metallurgical coke. Competitive conditions among coals for the several producing districts in the Appalachian fields and in the Eastern Interior districts of Illinois, Indiana, and western Kentucky vary from the keenly competitive struggle in the industrial and railroad fuel

Table 3.—National Production of Bituminous Coal, 1939–1948[a]
(In thousands of tons)

Year	Amount	Percent of change by years	Year	Amount	Percent of change by years
1939	394,855		1944	619,576	+ 4.8
1940	460,772	+16.7	1945	577,617	− 6.8
1941	514,149	+11.6	1946	533,922	− 7.6
1942	582,693	+13.3	*1947	630,624	+18.1
1943	590,177	+ 1.3	[b]1948	594,000	− 5.8

* Revised figure.
[a] Source: U. S. Bureau of Mines.
[b] Preliminary figure.

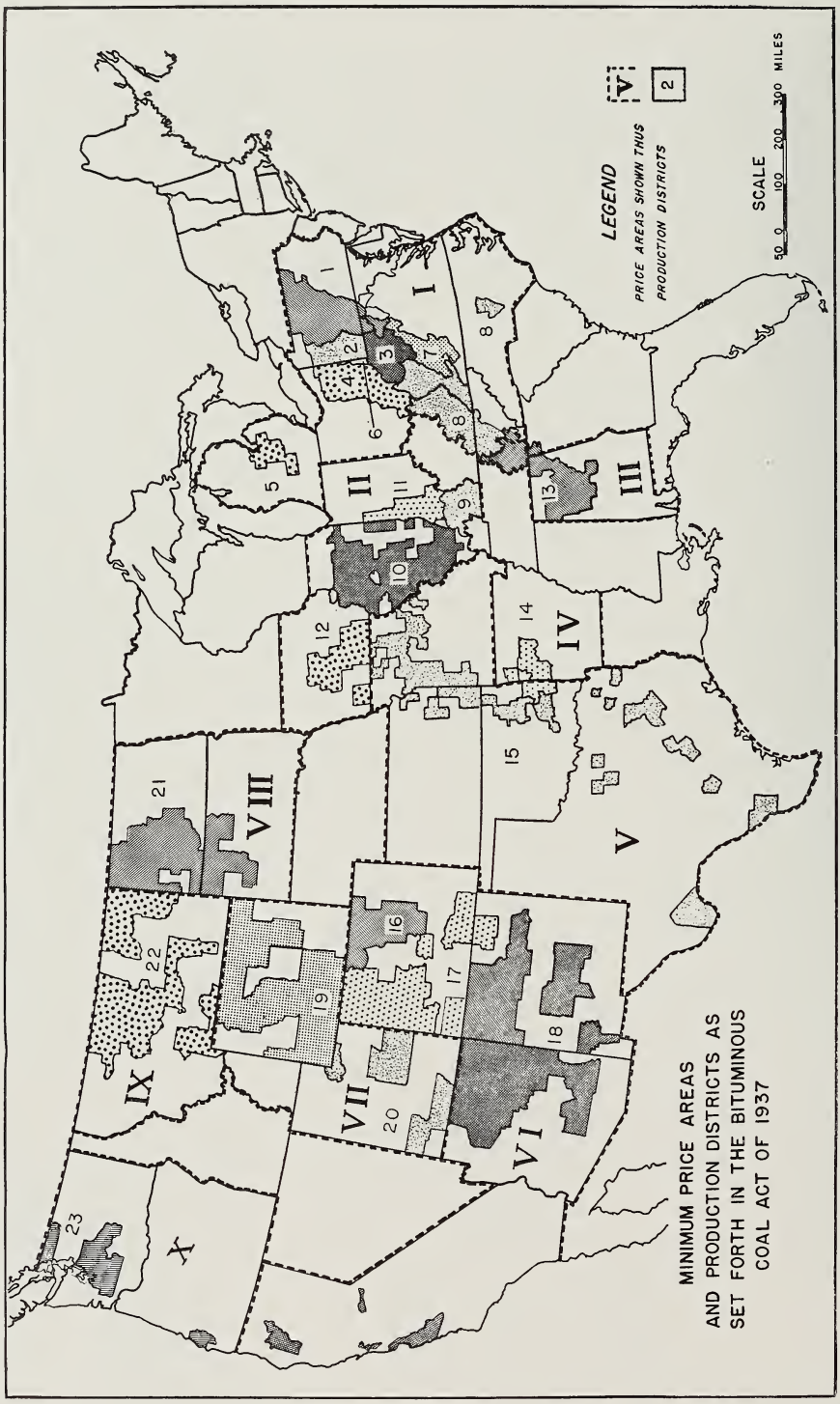

FIG. 2.—Minimum price areas and production districts.

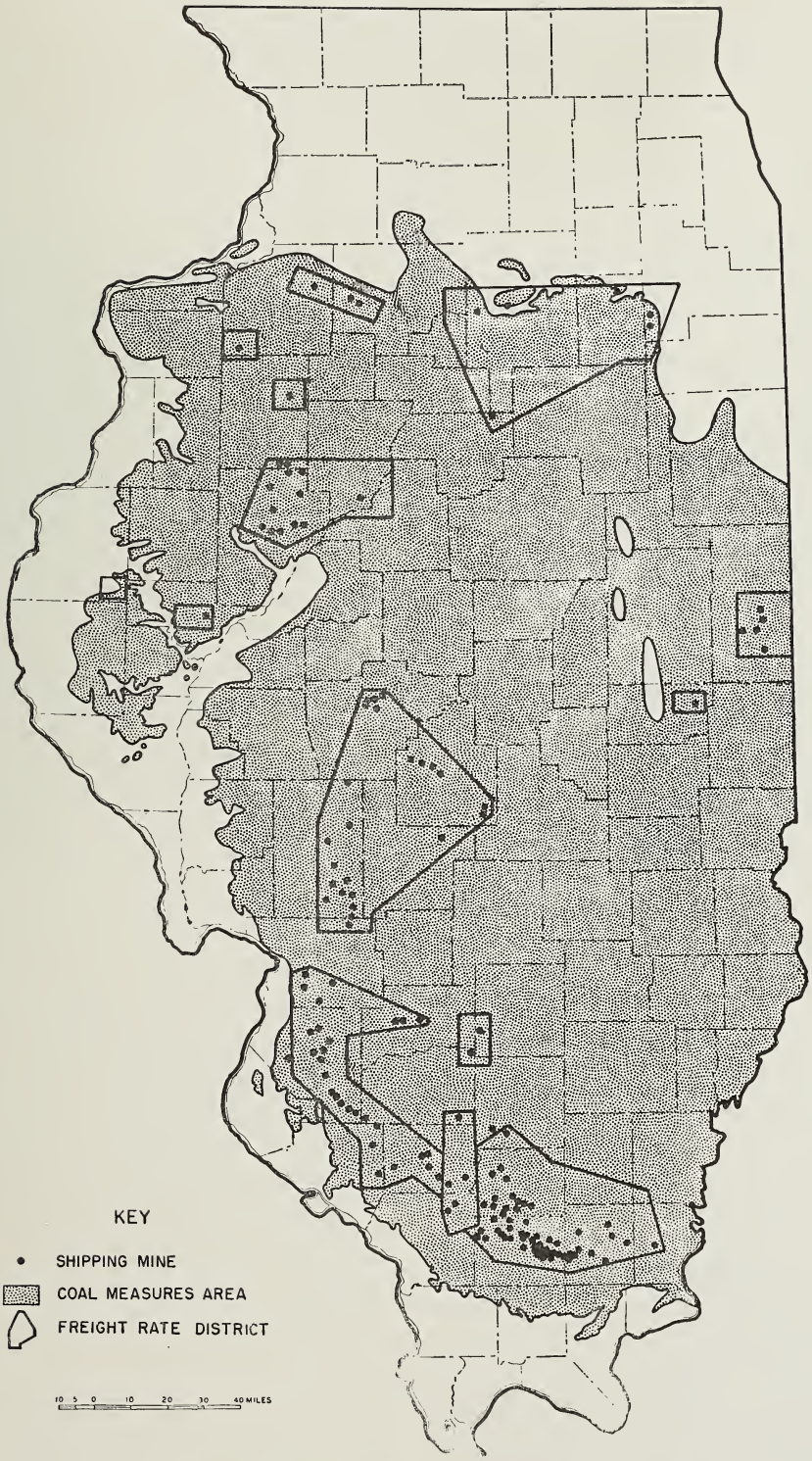

FIG. 3.—Shipping mines and freight districts of Illinois.

TABLE 4.—BITUMINOUS COAL PRODUCTION IN THE UNITED STATES, BY STATES, 1944–1948[a]
(In thousands of tons)

State	1944	1945	1946	1947*	1948[b]
Alabama	18,752	18,236	16,183	19,048	18,040
Alaska	349	298	367	361	410
Arkansas	1,972	1,854	1,631	1,871	1,660
Colorado	8,168	7,621	5,914	6,358	5,627
Illinois	76,792	73,011	63,469	67,860	66,500
Indiana	27,962	25,183	21,697	25,449	22,500
Iowa	2,141	2,046	1,788	1,684	1,750
Kansas	3,369	3,228	2,493	2,745	2,615
Kentucky	71,356	69,593	66,553	84,241	82,000
Maryland	1,870	1,763	2,003	2,051	1,596
Missouri	4,779	3,983	3,733	4,236	4,470
Montana	4,844	4,467	3,723	3,178	2,800
New Mexico	1,744	1,484	1,280	1,443	1,420
North and South Dakota	2,393	2,546	2,572	2,775	2,990
Ohio	33,877	32,737	32,314	37,548	36,104
Oklahoma	3,209	2,909	2,647	3,421	2,925
Pennsylvania	146,052	132,965	125,497	147,079	132,550
Tennessee	7,266	6,271	5,618	6,258	5,910
Texas	109	80	56	61	56
Utah	7,119	6,679	5,994	7,429	6,716
Virginia	19,514	17,235	15,527	20,171	19,620
Washington	1,524	1,357	991	1,118	1,210
West Virginia	164,704	152,035	144,020	176,157	168,200
Wyoming	9,540	9,847	7,635	8,051	6,300
Other States	171	189	217	31	31
Total	619,576	577,617	533,922	630,624	594,000

* Revised figures.
[a] Source: U. S. Bureau of Mines. Based on mines producing 1,000 tons or more per year.
[b] Preliminary figures.

markets to the less competitive conditions in the domestic fuel trade and the limited competition in the by-product coal demand.

Production of coal in principal fields competitive with Illinois fields is shown in table 6.

EASTERN INTERIOR BASIN

Table 7 shows coal production in the Eastern Interior coal basin for the years 1944-48, inclusive. The production history of three competitive districts in Illinois, Indiana, and western Kentucky and the contribution of each to the total production of the Eastern Interior basin from 1913 to 1942 are shown in table 4 of Report of Investigations No. 94, page 17.

CUMULATIVE COAL PRODUCTION

Table 8 gives cumulative coal production for Illinois, by counties, for the period 1882-1948, as compiled from the annual Coal Reports of the Department of Mines and Minerals. This includes an estimate of production for the period 1833-1881. Sixty-nine counties have a recorded production during this period. Eleven of these counties produced more than 100 million tons each, the highest recorded production being from Franklin County with a total of 427,894,772 tons (table 9).

A history of coal production, by counties, and by years, was published in Report of Investigations No. 140, pp. 26-37. Table 8 presents only the cumulative totals to

TABLE 5.—PRODUCTION OF BITUMINOUS COAL BY DISTRICTS, 1946–1948[a]
(In thousands of tons)

District	1946		1947*		1948[b]	
	Amount	Percent of total	Amount	Percent of total	Amount	Percent of total
Price Area 1						
1. Eastern Pennsylvania	54,445	10.2	62,832	10.0	57,678	9.7
2. Western Pennsylvania	74,775	14.0	87,610	13.9	77,424	13.0
3. Northern West Virginia	40,748	7.6	52,815	8.4	50,017	8.4
4. Ohio	32,314	6.1	37,548	5.9	36,104	6.1
5. Michigan	80	—	14	—	14	—
6. Panhandle	4,360	0.8	4,995	0.8	4,583	.8
7. Southern Numbered 1	52,532	9.8	61,782	9.8	59,380	10.0
8. Southern Numbered 2	114,256	21.4	142,608	22.6	135,831	22.9
Total—Price Area 1	373,510	69.9	450,204	71.4	421,031	70.9
Price Area 2						
9. West Kentucky	17,211	3.2	22,182	3.5	23,900	4.0
10. Illinois	63,469	11.9	67,860	10.8	66,500	11.2
11. Indiana	21,697	4.1	25,449	4.0	22,500	3.8
12. Iowa	1,788	.3	1,684	.3	1,750	.3
Total—Price Area 2	104,165	19.5	117,175	18.6	114,650	19.3
Price Area 3						
13. Southeastern	17,188	3.2	20,188	3.2	19,110	3.2
Total—All Eastern Districts	494,863		587,567		554,791	
Percent of U. S. Total		92.6		93.2		93.4
Total—United States	533,922		630,624		594,000	

* Revised figures.
[a] Source: U. S. Bureau of Mines.
[b] Preliminary figures.

TABLE 6.—PRODUCTION IN DISTRICTS WITH LARGE ALL-RAIL SHIPMENTS TO THE UPPER MISSISSIPPI VALLEY, 1944–1948[a]
(In thousands of tons)

Year	Districts 7 and 8: West Virginia, Kentucky, Virginia		Districts 9, 10, and 11: Illinois, Indiana, West Kentucky		Illinois	
	Amount	Index	Amount	Index	Amount	Index
1944	188,335	100	124,219	100	76,792	100
1945	172,756	92	118,638	96	73,011	95
1946	166,788	89	102,377	82	63,469	83
1947*	204,390	109	115,491	93	67,860	88
1948[b]	195,211	104	112,900	91	66,500	87

* Revised figures.
[a] Source: U. S. Bureau of Mines.
[b] Preliminary figures.

Table 7.—Production of Bituminous Coal in the Eastern Interior Coal Field, 1944–1948[a]
(In thousands of tons)

Year	Illinois		Indiana		West Kentucky		Total
	Amount	Percent[b]	Amount	Percent[b]	Amount	Percent[b]	
1944	76,792	61.8	27,962	22.5	19,465	15.7	124,219
1945	73,011	61.6	25,183	21.2	20,444	17.2	118,638
1946	63,469	62.0	21,697	21.2	17,211	16.8	102,377
1947*	67,860	58.8	25,449	22.0	22,182	19.2	115,491
1948[c]	66,500	58.9	22,500	19.9	23,900	21.2	112,900

* Revised figures.
[a] Source: U. S. Bureau of Mines.
[b] Percent of total in Eastern Interior Coal Field.
[c] Preliminary figures.

Table 8.—Total Coal Production, by Counties, 1882–1948[a]
(In tons)

County	Production	County	Production
Adams	46,186	Mercer	14,994,188
Bond	7,355,569	Monroe	8,284
Brown	57,117	Montgomery	76,323,371
Bureau	48,165,662	Morgan	177,250
Calhoun	96,247	Moultrie	2,032,236
Cass	212,477	Peoria	62,973,350
Christian	171,814,341	Perry	136,080,148
Clinton	37,185,930	Pike	5,081
Coles	198,932	Pope	1,562
Crawford	44,786	Putnam	10,071,893
Douglas	165,028	Randolph	58,362,196
Edgar	871,437	Richland	154
Effingham	796	Rock Island	3,846,169
Franklin	427,894,772	St. Clair	202,713,181
Fulton	140,249,803	Saline	168,519,981
Gallatin	3,996,747	Sangamon	228,463,215
Greene	620,767	Schuyler	2,752,294
Grundy	39,928,208	Scott	612,476
Hamilton	22,097	Shelby	4,119,550
Hancock	438,245	Stark	1,226,382
Hardin	40	Tazewell	17,393,015
Henry	17,858,345	Vermilion	144,827,291
Jackson	75,018,237	Wabash	186,144
Jasper	23,739	Warren	674,169
Jefferson	5,749,690	Washington	17,590,272
Jersey	119,080	White	1,676,741
Johnson	242,109	Will	33,830,437
Kankakee	1,948,786	Williamson	268,560,053
Knox	19,683,430	Woodford	7,782,257
LaSalle	65,325,083		
Livingston	10,071,067	Total (1882–1948)	3,035,846,976
Logan	13,984,377		
Macon	11,000,468	Estimated production (1833–1881)	73,386,123
Macoupin	248,269,437		
McDonough	2,634,605	Total production (1833–1948)	3,109,233,099
McLean	5,544,139		
Madison	149,500,826		
Marion	37,975,043		
Marshall	12,512,583		
Menard	13,217,405		

[a] Source: Illinois State Department of Mines and Minerals.

1948 inclusive. For the year by year history of coal production, by counties, reference must be made to Report of Investigations 140.

Production by Months

In table 10 is shown the production of coal in the United States and in Illinois by months. Normal seasonal trends are obscured in the production performance in 1948 because of two work suspensions, in March and June. Under pre-war conditions there was a summer slump in production which was usually more pronounced in the producing districts of Illinois, Indiana, and western Kentucky than in Appalachian fields; the latter have the advantage of the lake cargo market during the summer months. High demand for coal during the war years resulted in a full summer production in all coal-producing districts, except for the occurrence of work stoppages.

Table 9.—Counties of More than 100 Million Tons Output, 1882–1948[a]
(In tons)

Franklin	427,894,772
Williamson	268,560,053
Macoupin	248,269,437
Sangamon	228,463,215
St. Clair	202,713,181
Christian	171,814,341
Saline	168,519,981
Madison	149,500,826
Vermilion	144,827,291
Fulton	140,249,803
Perry	136,080,148
Total, 11 counties	2,286,893,048
Total, all counties of the State	3,035,846,976
Percent produced by 11 counties	75.3

[a] Source: Illinois State Department of Mines and Minerals.

Sizes and Types of Mines

Coal production in Illinois is divided between underground and stripping mines in a ratio of about three to one There is a gradual tendency toward a reduction of

Table 10.—Production of Bituminous Coal in the United States and in Illinois, by Months, 1948[a]
(In thousands of tons)

Month	U.S. production	Percent of monthly average	Illinois production	Percent of monthly average	Illinois percent of U.S. total production
January	56,631	114.4	6,381	115.1	11.3
February	50,395	101.8	5,991	108.1	11.9
March	34,399	69.5	4,137	74.6	12.0
April	35,151	71.0	4,206	75.9	12.0
May	56,583	114.3	5,802	104.7	10.2
June	53,118	107.3	5,482	98.9	10.3
July	48,611	98.2	5,241	94.6	10.8
August	53,779	108.6	5,801	104.7	10.8
September	52,158	105.4	5,477	98.8	10.5
October	53,447	108.0	6,169	111.3	11.5
November	49,791	100.6	5,806	104.8	11.7
December	49,937	100.9	6,007	108.4	12.0
Total	594,000		66,500		
Monthly Average	49,500		5,542		11.2

[a] Source: U. S. Bureau of Mines estimated monthly production figures.

TABLE 11.—COAL PRODUCTION OF ALL ILLINOIS
(In

County	Shipping Mines			
	Number of mines	Tons mined underground	Tons mined strip	Total tons mined
Brown	—	—	—	—
Bureau	1	—	99,127	99,127
Christian	5	7,916,645	—	7,916,645
Clinton	2	296,147	—	296,147
Douglas	1	114,311	—	114,311
Edgar	—	—	—	—
Franklin	12	13,310,042	—	13,310,042
Fulton	12	121,203	6,184,177	6,305,380
Gallatin	1	30,556	—	30,556
Grundy	1	—	118,127	118,127
Hancock	—	—	—	—
Henry	2	88,351	595,593	683,944
Jackson	5	745,365	454,836	1,200,201
Jefferson	1	570,676	—	570,676
Jersey	—	—	—	—
Knox	3	20,669	1,345,843	1,366,512
LaSalle	2	41,709	77,149	118,858
Livingston	—	—	—	—
Logan	—	—	—	—
Macoupin	9	4,281,292	—	4,281,292
Madison	4	1,736,826	—	1,736,826
Marion	1	238,667	—	238,667
Marshall	—	—	—	—
McDonough	—	—	—	—
Menard	—	—	—	—
Montgomery	1	925,221	—	925,221
Morgan	—	—	—	—
Peoria	1	392,735	—	392,735
Perry	9	2,412,156	2,798,729	5,210,885
Randolph	5	1,402,080	1,063,583	2,465,663
Rock Island	—	—	—	—
Saline	12	3,651,776	672,710	4,324,486
Sangamon	4	2,005,894	—	2,005,894
Schuyler	1	—	127,308	127,308
St. Clair	14	1,905,846	112,620	2,018,466
Tazewell	—	—	—	—
Vermilion	2	65,383	88,611	153,994
Warren	—	—	—	—
Washington	2	481,424	—	481,424
Will	2	—	1,664,282	1,664,282
Williamson	44	2,967,474	1,355,611	4,323,085
Woodford	1	13,658	—	13,658
Total	160	45,736,106	16,758,306	62,494,412

[a] Source: Illinois State Department of Mines and Minerals.

MINES BY TYPE OF MINE AND BY COUNTIES, 1948[a]
tons)

Local mines				County totals		
Number of mines	Tons mined underground	Tons mined strip	Total tons mined	Number of mines	Total tons mined	Percent of state total
2	2	2	4	2	4	—
—	—	—	—	1	99,127	.15
1	1,500	—	1,500	6	7,918,145	11.97
—	—	—	—	2	296,147	.45
—	—	—	—	1	114,311	.17
1	21,377	—	21,377	1	21,377	.03
—	—	—	—	12	13,310,042	20.12
14	182,604	1,568	184,172	26	6,489,552	9.81
9	46,656	—	46,656	10	77,212	.12
2	926	52,612	53,538	3	171,665	.26
1	—	47,077	47,077	1	47,077	.07
4	22,722	—	22,722	6	706,666	1.07
5	40,670	1,230	41,900	10	1,242,101	1.88
—	—	—	—	1	570,676	.86
1	—	456	456	1	456	—
1	107,702	—	107,702	4	1,474,214	2.23
5	14,341	9,597	23,938	7	142,796	.22
2	—	6,013	6,013	2	6,013	.01
1	49,528	—	49,528	1	49,528	.07
—	—	—	—	9	4,281,292	6.47
6	354,642	—	354,642	10	2,091,468	3.16
—	—	—	—	1	238,667	.36
1	78	—	78	1	78	—
4	305	12	317	4	317	—
5	28,162	—	28,162	5	28,162	.04
—	—	—	—	1	925,221	1.40
1	—	27	27	1	27	—
24	273,884	19,060	292,944	25	685,679	1.04
3	16,975	—	16,975	12	5,227,860	7.90
3	34,339	—	34,339	8	2,500,002	3.78
1	643	—	643	1	643	—
9	130,089	180	130,269	21	4,454,755	6.73
6	213,549	—	213,549	10	2,219,443	3.35
9	16,646	3,298	19,944	10	147,252	.22
12	163,346	916,250	1,079,596	26	3,098,062	4.68
2	78,899	—	78,899	2	78,899	.12
18	231,379	27,390	258,769	20	412,763	.62
1	2,292	—	2,292	1	2,292	—
2	13,717	—	13,717	4	495,141	.75
—	—	—	—	2	1,664,282	2.51
26	508,186	32,462	540,648	70	4,863,733	7.35
—	—	—	—	1	13,658	.02
						Other .01
182	2,555,159	1,117,234	3,672,393	342	66,166,805	100.00

the number of underground mines among the smaller sizes of these mines. Strip mines are increasing in number but not in proportion to total output (tables 11, 13, 14, 16). Local mines, although numerous, play a relatively unimportant role in the total coal supply of the State.

Coal Prices

Coal prices continued to rise in 1948 above 1947 levels. Table 17 gives prices of coal, at the mine, as of December 1948, for districts supplying the Illinois coal market area, and comparable prices for December 1947.

Coal Exports

For the last seven years, the United States has exported a total of 260 million tons of coal, an average of 37 million tons a year (table 20). Under normal conditions the export level is from 12 to 14 million tons, of which 3 to 4 million tons go to the Caribbean and the remainder to Canada. War requirements abroad, and the need for coal in supplies to rehabilitate the economies of Europe, raised the shipments after 1942. The peak was reached in 1947 with a total export of 69 million tons. There was a decline of 23 million tons from the 1947 level in 1948, and further decreases may be expected as European recovery proceeds.

Illinois Coking Coal

Coal from Illinois supplied to coke plants in Illinois and Indiana increased again in 1948. Table 19 gives the amount of coal shipped from Illinois mines from 1938 to 1948. Table 18 gives the production of coke and by-products in Illinois coke ovens for the years 1945 to 1948.

Summary of Table 11[a]
(In tons)

Type of mines	1947		1948	
	Number of mines	Net tons produced	Number of mines	Net tons produced
Strip mines				
Shipping	39	16,776,964	45	16,758,306
Local	28	1,044,375	30	1,117,234
Total	67	17,821,339	75	17,875,540
Underground mines				
Shipping	121	47,835,663	115	45,736,106
Local	174	2,668,239	152	2,555,159
Total	295	50,503,902	267	48,291,265
Grand total	362	68,325,241	342	66,166,805

[a] Source: Illinois State Department of Mines and Minerals.

TABLE 12.—ILLINOIS COAL PRODUCTION BY COUNTIES, 1943–1947[a]
(In tons)

County	1943	1944	1945	1946	1947
Brown	60	—	—	1,570	176
Bureau	153,871	120,463	133,349	98,764	700,385
Christian	6,846,942	7,896,234	7,492,841	6,415,384	7,300,494
Clinton	382,121	366,843	384,391	228,315	332,967
Douglas	—	—	—	363	50,354
Edgar	34,365	41,408	33,591	35,358	29,054
Franklin	16,684,419	18,173,694	17,247,446	14,470,904	14,790,608
Fulton	6,464,187	6,766,138	6,098,360	5,112,141	7,110,451
Gallatin	45,683	69,253	83,522	73,440	89,776
Greene	375	42	16	16	32
Grundy	53,244	30,237	142,321	207,190	211,581
Hancock	11	—	—	—	18,758
Henry	732,376	669,489	548,453	549,943	116,650
Jackson	2,707,336	3,026,855	2,920,208	2,399,210	1,327,234
Jefferson	626,506	478,057	623,677	493,435	533,612
Jersey	—	32	—	—	—
Knox	1,617,843	2,132,790	1,646,868	1,548,801	777,599
LaSalle	331,963	255,598	214,214	161,936	173,473
Livingston	1,616	3,133	8,886	6,509	6,503
Logan	46,500	52,338	60,852	51,822	53,658
McDonough	2,506	773	598	938	1,260
Macon	46,241	38,167	29,683	21,769	1,539
Macoupin	5,580,641	5,518,050	5,328,029	4,985,062	5,037,173
Madison	2,279,665	2,114,632	2,129,748	2,140,014	2,218,667
Marion	285,768	302,274	169,460	177,335	265,006
Marshall	3,813	1,853	793	461	98
Menard	80,091	46,791	52,916	42,831	34,489
Mercer	6,666	1,377	1,472	1,263	445
Montgomery	980,254	982,346	949,517	842,210	923,812
Morgan	53	—	—	—	—
Peoria	812,412	624,151	643,734	595,799	670,667
Perry	4,203,721	4,649,481	4,374,370	3,759,892	5,017,972
Randolph	2,519,267	2,695,442	2,808,523	2,289,892	2,660,827
Rock Island	3,331	1,941	972	1,061	413
St. Clair	3,183,437	3,115,436	3,020,478	3,062,582	3,440,300
Saline	4,388,307	4,504,148	4,557,481	4,233,318	4,151,746
Sangamon	3,290,786	2,911,012	2,498,072	2,132,845	2,258,105
Schuyler	243,505	257,116	202,515	148,015	120,751
Shelby	1,162	—	330	546	200
Stark	2,784	809	243	150	18
Tazewell	129,284	128,223	115,217	79,678	92,361
Vermilion	2,462,645	2,443,182	2,216,046	1,344,823	660,026
Wabash	1,023	—	—	—	—
Warren	5,735	4,313	3,418	2,908	2,339
Washington	473,105	535,359	554,082	482,153	352,548
Will	1,545,864	1,779,552	1,735,678	1,416,726	1,707,956
Williamson	4,053,190	4,639,677	4,393,362	4,133,819	5,070,682
Woodford	30,087	21,322	21,198	15,891	12,476
Total	73,344,761	77,400,031	73,446,930	63,767,082	68,325,241

[a] Source: Illinois State Department of Mines and Minerals.

TABLE 13.—AMOUNT AND VALUE OF COAL PRODUCED IN ILLINOIS, SHOWING NUMBER AND TYPE OF MINES, 1938–1948[a]

Year	Number of Mines							Production (thousands of tons)							Value at Mines[b]	
	Shipping		Local		Total			Strip			Underground				Total (thousands of dollars)	Average per ton
	Strip	Underground	Strip	Underground	Strip	Underground	All	Shipping	Local	Total strip	Shipping	Local	Total Underground	Total production		
1938.....	25	124	74	746	99	870	969	10,059	620	10,679	28,384	3,324	31,708	42,387	$ 63,581	$ 1.50
1939.....	26	120	82	748	108	868	976	11,296	990	12,286	31,698	3,643	35,341	47,627	78,108	1.64
1940.....	27	112	53	696	80	808	888	12,025	1,255	13,280	34,047	3,955	38,002	51,282	86,667	1.69
1941.....	29	113	29	628	58	741	799	13,361	881	14,242	37,673	3,451	41,124	55,366	100,212	1.81
1942.....	28	114	30	513	58	627	684	14,827	1,111	15,938	46,297	3,511	49,808	65,746	125,575	1.91
1943.....	26	116	22	326	48	442	489	15,485	1,314	16,799	53,487	3,059	56,546	73,345	156,224	2.13
1944.....	30	135	18	224	48	359	406	17,108	968	18,076	56,850	2,474	59,324	77,400	172,602	2.23
1945.....	36	122	16	206	52	328	380	16,204	807	17,011	54,097	2,342	56,436	73,447	171,866	2.34
1946.....	36	124	24	189	60	313	373	14,303	905	15,208	46,630	1,929	48,559	63,767	166,432	2.61
1947.....	39	121	28	174	67	295	362	16,777	1,044	17,821	47,836	2,668	50,504	68,325	*215,224	*3.15
1948.....	45	115	30	152	75	267	342	16,758	1,117	17,875	45,736	2,555	48,291	66,167	[c]242,171	[c]3.66

* Revised figures.
[a] Source: Illinois State Department of Mines and Minerals.
[b] Based on U. S. Bureau of Mines average price per ton.
[c] Preliminary figures.

TABLE 14.—COAL PRODUCTION FROM ILLINOIS UNDERGROUND MINES, BY COUNTIES, 1943–1947[a]
(In tons)

County	Total from mines producing 1,000 or more tons per year				
	1943	1944	1945	1946	1947
Bureau	34,067	19,543	14,029	11,375	6,383
Christian	6,846,942	7,896,234	7,492,841	6,415,384	7,300,494
Clinton	382,121	366,843	384,391	228,315	332,967
Douglas	—	—	—	—	50,354
Edgar	34,365	41,216	33,591	34,938	28,154
Franklin	16,684,419	18,173,694	17,247,446	14,470,904	14,790,608
Fulton	457,383	387,117	304,344	260,592	276,460
Gallatin	44,341	67,396	58,930	71,628	87,446
Grundy	3,264	—	—	—	—
Henry	201,693	145,356	126,721	131,153	116,034
Jackson	2,087,456	2,441,334	2,404,921	1,905,683	877,628
Jefferson	626,440	478,034	623,647	493,400	533,570
Knox	229,422	192,489	155,834	107,673	110,666
LaSalle	183,020	135,260	98,018	79,948	65,097
Livingston	1,022	—	—	—	—
Logan	46,500	51,594	60,852	51,822	52,778
Marshall	1,489	—	—	—	—
Macon	46,241	38,167	29,683	21,769	1,539
Macoupin	5,580,441	5,518,050	5,328,029	4,985,062	5,037,173
Madison	2,279,171	2,114,632	2,129,748	2,139,327	2,218,667
Marion	285,768	302,274	169,460	177,335	265,006
Menard	80,009	45,802	52,916	42,731	34,489
Mercer	5,878	1,377	1,472	1,223	—
Montgomery	980,254	982,346	949,517	842,210	923,812
Peoria	806,656	621,879	641,360	593,994	667,526
Perry	1,532,242	1,863,796	1,543,689	1,265,962	2,360,155
Randolph	1,627,356	1,638,394	1,621,228	1,351,207	1,599,113
Rock Island	1,987	1,256	—	—	—
St. Clair	2,042,346	2,044,245	2,079,104	2,043,593	2,292,278
Saline	3,759,679	3,930,892	3,891,702	3,533,089	3,506,225
Sangamon	3,290,886	2,911,012	2,497,730	2,132,409	2,257,172
Schuyler	25,605	21,173	16,065	17,920	10,671
Stark	1,100	—	—	—	—
Tazewell	129,284	127,635	114,808	79,544	92,361
Vermilion	2,399,094	2,401,974	2,130,042	1,293,802	561,097
Wabash	1,023	—	—	—	—
Warren	5,735	4,313	3,418	2,908	2,339
Washington	473,105	535,359	554,082	482,153	352,548
Williamson	3,257,481	3,778,599	3,641,409	3,257,070	3,665,906
Woodford	30,087	21,322	21,198	15,891	12,476
Total	56,505,372	59,300,607	56,422,225	48,542,014	50,489,192
Other underground production	40,950	23,302	13,509	17,264	14,710
Grand total	56,546,322	59,323,909	56,435,734	48,559,278	50,503,902

[a] Source: Illinois State Department of Mines and Minerals.

TABLE 15.—PRODUCTION OF SHIPPING COAL MINES BY FREIGHT RATE DISTRICTS IN ILLINOIS, 1946–1947[a, b]
(In tons)

Freight rate district	1946		1947	
	Tons	Percent of total	Tons	Percent of total
Alpha	111,896	.2	95,797	.1
Augusta	—	—	—	—
Belleville	8,105,199	13.3	8,895,986	13.8
Centralia	636,691	1.0	593,092	.9
Danville	1,201,577	2.0	438,808	.8
Duquoin	3,449,286	5.7	3,382,777	5.2
Fulton-Peoria	6,089,143	10.0	7,302,044	11.3
Mineral-Atkinson	506,120	.8	694,002	1.1
Murdock	363	—	50,354	—
Northern Illinois	1,739,785	2.8	2,005,087	3.1
Rushville	128,296	.2	107,900	.2
Southern Illinois	22,957,461	37.7	23,982,728	37.1
Springfield	15,288,397	25.1	16,397,210	25.4
Victoria	718,571	1.2	666,842	1.0
Total	60,932,785	100.0	64,612,627	100.0

[a] Figures from annual coal reports, 1946 and 1947, Illinois Department of Mines and Minerals; freight rate districts from Illinois Geological Survey Coal Map, 1947, by G. H. Cady.
[b] Subject to revision.

TABLE 16.—COAL PRODUCTION FROM ILLINOIS STRIP MINES, BY COUNTIES, 1943–1947[a]
(In tons)

County	Total from mines producing 1,000 tons or more per year				
	1943	1944	1945	1946	1947
Brown	—	—	—	1,570	—
Bureau	118,646	100,920	119,320	87,389	694,002
Fulton	6,001,721	6,373,429	5,791,266	4,848,280	6,831,618
Gallatin	—	—	22,919	—	—
Grundy	49,074	30,237	142,321	207,190	211,581
Hancock	—	—	—	—	18,758
Henry	530,683	523,436	421,667	418,731	—
Jackson	619,189	584,815	515,287	493,527	449,356
Knox	1,385,935	1,939,780	1,490,613	1,440,921	666,842
LaSalle	147,500	119,830	115,745	81,642	107,948
Livingston	—	2,328	8,670	6,189	6,453
McDonough	1,392	—	—	—	—
Marshall	1,077	—	—	—	—
Peoria	—	—	—	—	2,000
Perry	2,671,479	2,785,685	2,830,681	2,492,000	2,657,817
Randolph	891,911	1,057,048	1,187,295	938,685	1,061,714
St. Clair	1,140,248	1,069,697	940,966	1,018,397	1,147,172
Saline	628,401	573,256	665,779	699,629	644,911
Schuyler	216,274	235,508	185,891	128,296	109,010
Vermilion	56,238	39,431	82,849	48,395	97,433
Will	1,545,864	1,779,552	1,735,678	1,416,726	1,707,956
Williamson	791,454	858,568	751,809	875,786	1,403,891
Total	16,797,086	18,073,520	17,008,756	15,203,353	17,818,462
Other strip production	1,353	2,602	2,440	4,451	2,877
Grand total	16,798,439	18,076,122	17,011,196	15,207,804	17,821,339

[a] Source: Illinois State Department of Mines and Minerals.

Table 17.—Coal Mine Prices per Ton, December 1947 and December 1948[a]

	1947	1948
Southern Illinois: Freight rate[b] to Chicago $2.70 a ton		
Lump	$4.60 — $4.75	$5.20 — $5.30
Egg	4.60 — 4.75	4.90 — 5.15
Stoker (domestic)	—	5.60 — 5.75
Screenings (washed)	4.50 — 4.60	4.60 — 5.15
Screenings	3.75 — 3.95	4.55 — 4.75
Central Illinois: Freight rate to Chicago $2.40 a ton		
Lump	4.25 — 4.60	4.85 — 5.05
Egg	4.25 — 4.45	4.75 — 4.95
Stoker (domestic)	—	4.85
Screenings (washed)	4.50 — 4.70	4.75
Screenings	3.35 — 3.65	4.50 — 5.05
Indiana No. 4: Freight rate to Chicago $2.28–2.40 a ton		
Lump	4.25 — 4.60	5.00
Egg	4.25 — 4.60	5.00
Stoker nut	4.60 — 4.75	5.25
Screenings	3.50 — 3.75	4.75
Indiana No. 5: Freight rate to Chicago $2.28–2.55 a ton		
Lump	4.25 — 4.60	4.90
Egg	4.25 — 4.50	4.90
Stoker nut	—	5.10
Screenings	3.75 — 3.85	4.20
New River and Pocahontas: Freight rate to Chicago $4.09 a ton		
Lump	6.80 — 7.00	7.50 — 8.00
Egg	6.90 — 7.00	7.50 — 8.00
Stove	7.00	7.50 — 8.00
Nut	6.50	7.50 — 8.00
Mine run (domestic)	6.60	7.50 — 8.00
East Kentucky, West Virginia High Volatile: Freight rate to Chicago $3.89 a ton		
Block	6.75 — 7.00	7.50 — 8.25
Furnace	6.75 — 7.00	7.25 — 8.25
Nut	5.05 — 5.15	7.25 — 8.25
Stoker	5.50	7.85 — 8.25
West Kentucky No. 6: Freight rate to Chicago $3.00 a ton		
Lump, 6″	4.65	5.30
Egg, 6″ x 3″	4.65	5.15
Stoker nut	5.35	5.70
Screenings	4.95	4.60
West Kentucky No. 9: Freight rate to Chicago $3.00 a ton		
Lump, 6″	4.40	4.80
Egg, 6″ x 3″	4.40	4.65
Stoker nut	4.00	4.80
Screenings	3.40	4.40
West Kentucky No. 11: Freight rate to Chicago $3.00 a ton		
Washed furnace	3.95	4.70
Washed small egg	3.95	4.35
Washed nut	3.85	4.35
Washed commercial stoker	4.00	4.80
Mine run	3.70	4.00

[a] Source: Chicago Journal of Commerce.
[b] Freight rates as of December 1948.

TABLE 18.—COKE AND BY-PRODUCTS PRODUCED, SOLD,

	1945		
	Quantity	Value at plants	
		Thousands of dollars	Av.
Coal used (M tons)	5,198	$32,034	$ 6.16
Coal per ton of coke (tons)	1.41	—	8.69
Coke produced (M tons)	3,682	32,378	8.79
Yield of coke (percent of coal used)	70.83	—	—
Plants in operation	9	—	—
Ovens in existence Dec. 31	882	—	—
Capacity (M tons)	4,005	—	—
New ovens	0	—	—
Abandoned	110	—	—
Under construction	0	—	—
Sources of coal used (M tons)			
Illinois	246	—	—
Indiana	51	—	—
Kentucky	1,792	—	—
Pennsylvania	438	—	—
West Virginia	2,718	—	—
Other	0	—	—
Total (M tons)	5,247	—	—
Coke sold or used by producer (M tons)			
Used by producer in blast furnace	1,742	14,167	8.13
Sold for furnace use	1,218	10,558	8.67
Sold for foundry use	314	3,815	12.10
Sold for domestic use	356	3,415	9.57
Sold for industrial and other use	84	731	8.70
Coke oven by-products			
Ammonia produced (sulfate equiv.) (M lbs.)	92,942	—	—
Per ton of coal coked (lbs.)	17.88	—	—
Sulfate equivalent sold (M lbs.)	97,612	1,199	0.012
Coke oven gas produced (Millions cu. ft.)	50,638	—	—
Used	15,555	—	—
Sold	34,457	4,983	0.145
Light oil and derivatives sold (M gal.)	7,455	1,102	0.149
Tar produced (M gal.)	35,547	—	—
Per ton of coal coked (gal.)	6.84	—	—
Tar and derivatives sold (M gal.)	35,635	1,892	0.053
Total coke and by-products used or sold		$41,862	

[a] Source: U. S. Bureau of Mines.

OR USED BY PRODUCERS IN ILLINOIS, 1945–1948[a]

1946			1947			1948			Percent change in amount from 1947
Quantity	Value at plants		Quantity	Value at plants		Quantity	Value at plants		
	Thousands of dollars	Av.		Thousands of dollars	Av.		Thousands of dollars	Av.	
4,505	$30,196	$6.70	5,359	$42,897	$ 8.00	5,221	$48,963	$9.38	− 2.6
1.41	—	9.46	1.41	—	11.27	1.42	—	13.32	—
3,192	32,242	10.10	3,805	49,268	12.95	3,675	54,397	14.80	− 3.4
70.86	—	—	71.01	—	—	70.39	—	—	—
9	—	—	8	—	—	8	—	—	—
856	—	—	856	—	—	852	—	—	—
3,899	—	—	3,845	—	—	3,810	—	—	—
0	—	—	0	—	—	0	—	—	—
26	—	—	0	—	—	4	—	—	—
0	—	—	0	—	—	51	—	—	—
215	—	—	227	—	—	261	—	—	—
37	—	—	64	—	—	111	—	—	—
1,481	—	—	2,010	—	—	2,006	—	—	—
390	—	—	212	—	—	175	—	—	—
2,326	—	—	2,762	—	—	2,680	—	—	—
0	—	—	25	—	—	3	—	—	—
4,449	—	—	5,300	—	—	5,236	—	—	—
1,532	15,135	9.88	1,793	20,341	11.34	1,733	23,923	13.80	− 3.4
949	9,072	9.56	1,365	19,926	14.60	1,304	19,611	15.04	− 4.5
314	4,179	13.28	355	5,819	16.39	373	7,373	19.77	+ 5.1
239	2,470	10.32	133	1,468	11.04	100	1,207	12.07	−24.81
81	772	9.56	92	1,030	11.20	99	1,309	13.22	+ 7.61
79,057	—	—	90,797	—	—	84,467	—	—	− 7.0
19.34	—	—	18.90	—	—	18.52	—	—	—
79,585	1,105	0.014	89,970	1,416	0.016	86,212	1,781	0.021	− 4.2
45,246	—	—	52,641	—	—	51,557	—	—	− 2.0
13,653	—	—	17,518	—	—	18,241	—	—	+ 4.1
31,062	4,524	0.146	34,357	5,044	0.147	32,485	4,973	0.153	− 5.4
6,894	927	0.134	9,009	1,529	0.170	8,105	1,609	0.20	−10.03
30,225	—	—	35,154	—	—	33,707	—	—	− 4.1
6.71	—	—	6.56	—	—	6.45	—	—	—
30,606	1,646	0.054	34,679	2,652	0.076	33,445	3,469	0.104	− 3.6
	$39,830			$59,225			$65,255		+10.18

TABLE 19.—ILLINOIS COAL SUPPLIED TO ILLINOIS AND INDIANA COKE PLANTS, 1938–1948[a]
(In tons)

Year	To Illinois plants	To Indiana plants	Total
1938	106,667	—	106,667
1939	123,248	—	123,248
1940	214,845	—	214,845
1941	236,251	—	236,251
1942	227,197	128,490	355,687
1943	218,496	295,898	514,394
1944	141,067	4,493	145,560
1945	246,304	—	246,304
1946	214,545	176,205	390,750
1947	226,873	225,907	452,780
1948	261,338	344,153	605,491

[a] Source: U. S. Bureau of Mines.

TABLE 20.—UNITED STATES EXPORTS OF BITUMINOUS COAL, 1938–1948[a]
(Thousands of tons)

Year	Amount
1938	10,490.3
1939	11,590.5
1940	16,465.9
1941	20,740.5
1942	22,943.3
1943	25,836.2
1944	26,032.3
1945	27,956.2
1946	41,208.6
1947*	68,667.0
1948[b]	45,918.2

* Revised figures.
[a] Source: U. S. Bureau of Mines.
[b] Preliminary figures.

TABLE 21.—PRODUCTION AND VALUE OF PACKAGED FUEL, UNITED STATES, 1944–1948[a]

Year	Production (in tons)			Value of production	Plants in operation	Average value per net ton f.o.b. plant	
	Eastern states	Central states	Total			Eastern states	Central states
1944	3,788	171,982	175,770	$2,053,343	68	$12.26	$11.67
1945	16,606	191,537	208,143	2,518,636	61	12.86	12.04
1946	9,065	181,854	190,919	2,496,388	70	12.93	13.08
1947	2,153	180,728	182,881	2,882,105	62	16.58	15.75
1948	1,859	155,154	157,013	2,735,861	62	17.64	17.42

[a] Source: U. S. Bureau of Mines.

TABLE 22.—PRODUCTION, CONSUMPTION, AND VALUE OF FUEL BRIQUETS, UNITED STATES, 1944–1948[a]
(In tons)

Year	Production				Imports	Exports	Apparent consumption	Value of production	Plants in operation	Average value per net ton f.o.b. plant		
	Eastern states	Central states	Pacific states	Total						Eastern states	Central states	Pacific states
1944.....	625,779	1,704,005	135,177	2,464,961	538	163,672	2,301,827	$18,434,579	30	$5.42	$8.03	$10.07
1945.....	637,740	1,991,733	132,731	2,762,204	722	174,107	2,588,819	21,678,886	32	5.65	8.40	10.04
1946.....	880,109	1,986,234	137,684	3,004,027	653	163,339	2,841,341	25,299,612	35	6.61	9.03	11.26
1947.....	1,089,705	1,966,834	115,057	3,171,596	387	248,760	2,923,223	30,762,253	35	7.82	10.56	12.77
1948.....	1,151,041	1,820,074	157,362	3,128,477	329	207,885	2,920,921	36,011,322	36	9.55	12.58	13.51

[a] Source: U. S. Bureau of Mines.

COKE INDUSTRY

The primary function of coke is to reduce ores to the metallic state. Whatever other uses may have been found for coke are but incidental in the economic significance of this material. The reduction of iron ore in the blast furnace using coke as a fuel is so far superior in terms of economy to any other method of ore reduction that there are no rivals. This is of fundamental significance, for it is at present the only means which we know of for obtaining iron cheaply.

The other uses of coke, such as house heating and gas making, are incidental contributions and refinements in a technology which became possible only after low-cost smelting of iron ores was accomplished.

Coke is an artificially prepared fuel, the residue that remains after certain bituminous coals have been subjected to destructive distillation. The product of the coke oven is cellular in structure, and almost entirely carbon. The other ingredients of coal, ash, sulfur, and phosphorus, are impurities. For metallurgical use coke must be quick-burning to produce a high temperature, and strong enough to support a weight of ores. Coal from which coke with these requisites can be produced is comparatively limited in quantity. Coking coals, therefore, acquire high value and will increase in value in the future.

The evolution of the coke manufacturing process, first in the beehive oven and more lately in the modern by-product oven, stands as one of the significant developments in the transformation of industrial society from the handicraft and semi-handicraft stage to a power-operated economy. For, in addition to its unique characteristics as a fuel for the reduction of iron ore, a coke supply freed the metallurgical industry from the sharp limitations of fuels hitherto available for smelting ores—charcoal and anthracite.

With the advent of the coke oven and the blast furnace, the requisites for industrialization—cheap steel—emerged into a reality. These two instruments of production, the coke oven as the producer, in mass tonnages, of a requisite fuel, and the blast furnace, the highly efficient producer of pig iron in mass tonnages, are the gateways to a highly productive, versatile, complex industrial economy. Other methods of obtaining raw iron and steel have been proposed but, to date, none show any possibility of replacing the blast furnace with heat supplied by coke.

The coke oven, then, together with the blast furnace, becomes the symbol of productiveness, the basis of a high standard of living, of power.

Although the key function of coke in industry is a fuel for smelting iron ores and also for foundry fuel, other uses have also been found for it. Coke is used as a domestic fuel, in nitrogen fixation, in gas manufacture, and as a smokeless fuel in certain industries. The by-products, recovered from the destructive distillation of coal, supply ammonium fertilizers, gas, a multitude of tar products and light oils suitable for motor fuel and for chemical raw materials.

These other uses, while performing no fundamental role in the functioning of our industrial economy, do, nevertheless, increase substantially the aggregate value of the products of the coking process and, in this respect, tend to decrease somewhat the cost of metallurgical coke. The value of these by-product industries is brought out by a consolidated balance sheet of costs and realizations of the beehive and by-product processes.

Evolution of Coke Manufacture

The beehive oven era.—The quest for a suitable fuel for smelting iron ore in the blast furnace led first to the beehive oven. This type of oven was singularly well adapted to the early era of the iron and steel industry. Coke was needed primarily for iron-ore smelting. There was no demand for other uses. The art of by-product recovery was then unknown and it is doubtful if a profitable market for by-prod-

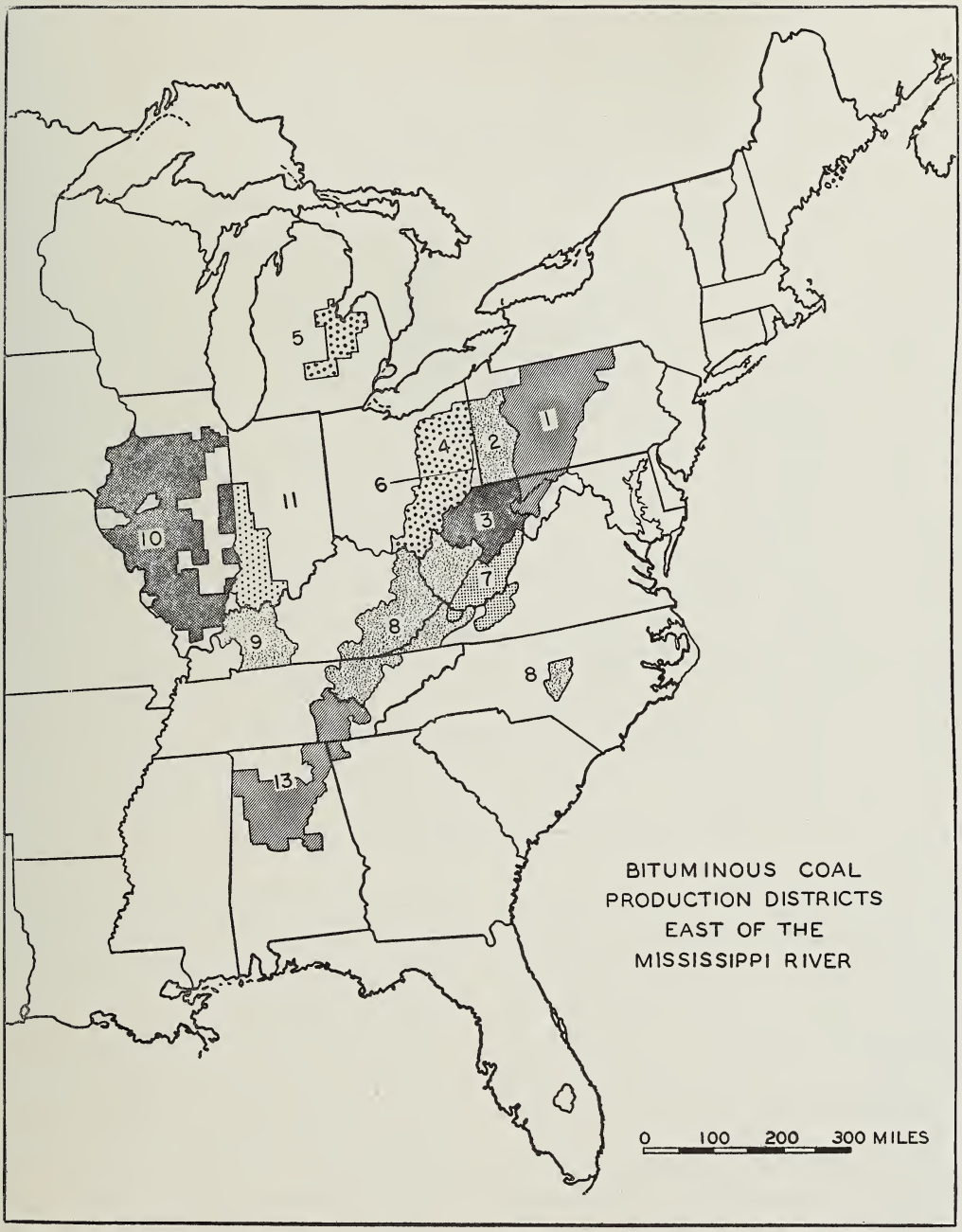

FIG. 4.—Bituminous coal producing districts east of the Mississippi River.

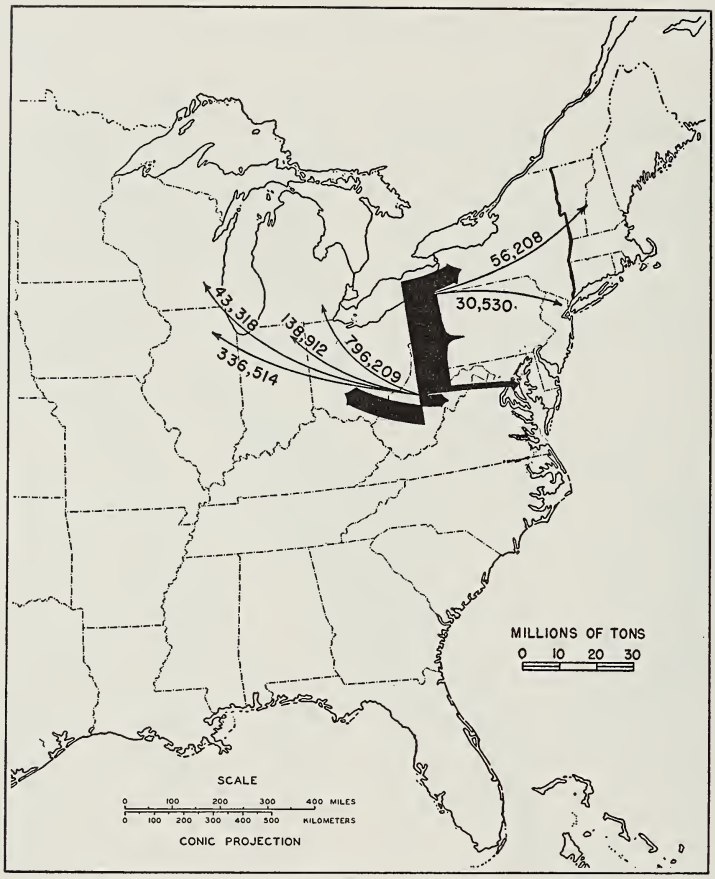

FIG. 5.—Flow of coking coal from Districts 1, 2, and 3.

ucts could have been readily developed. The elaborate industrial economy with its intricate interrelationships among industries, the use of by- or waste-products of one as the raw material for another was, at best, but feebly developed. The iron industry needed a hard, porous, quick-burning fuel for smelting, and it obtained this fuel by distilling off the volatile contents of a suitable coal.

In an economy just emerging from a dominantly agricultural state into an incipient industrialism, the beehive oven was the only practical instrument for the manufacture of a metallurgical fuel for the expanding pig-iron industry. In spite of its wastefulness of the volatile ingredients of coal, the beehive oven, nevertheless, fitted the economy of its day. Capital requirements were small by comparison to the modern oven. The ovens were located near the source of coal which, in the early days of the iron industry, was in the Pittsburgh district, and this effected economies in assembly of materials.

Today the beehive oven is relegated to a minor role in the coke manufacturing industry. It is still useful as a means of quickly expanding coke production in small increments, or to reduce output, at a small expense of plant write-off, in a period of declining coke demand.

The first beehive oven appears to have been put into operation in 1841, and the first successful use of coke as a blast-furnace fuel was demonstrated in 1859 in Pittsburgh. From that time the output of coke increased rapidly.

The by-product era.—The first battery of Semet-Solvay by-product coke ovens was

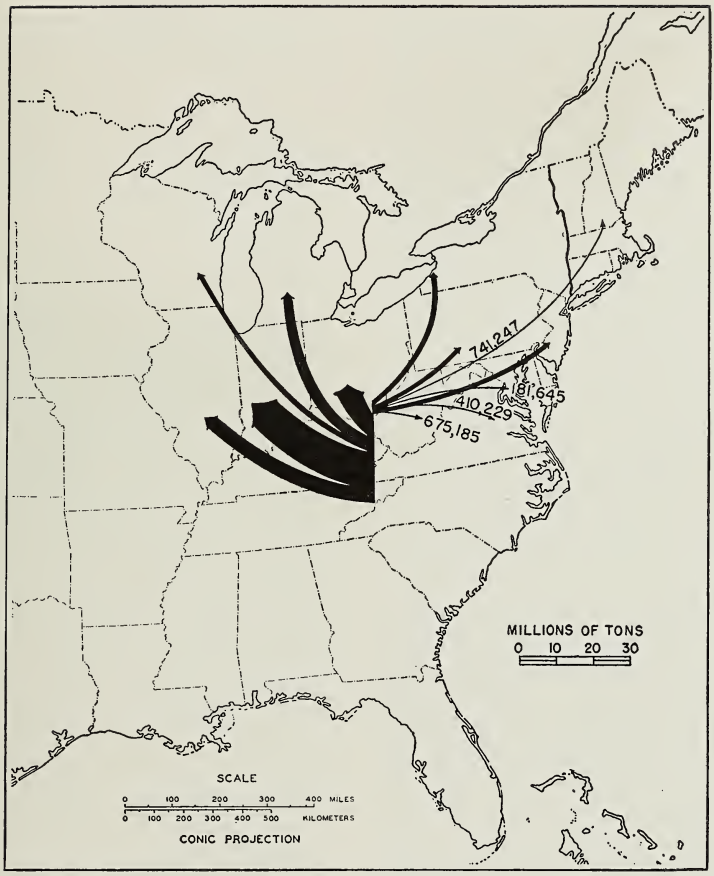

FIG. 6.—Flow of coking coal from Districts 7 and 8.

built at Syracuse, New York, in 1893. The output of by-product coke that year was 12,850 tons and represented 0.1 percent of the year's output. From that date there was a steady and noteworthy increase in construction of by-product ovens. By 1919 the output of by-product coke exceeded that of the beehive oven, and by 1937 the latter was reduced to a contribution of six percent of the total output. Only the exigencies of a world at war and the immediate need of a rapid increase in coke output brought about an upturn in beehive coke manufacture during the war years. The displacement of the beehive oven in favor of the by-product oven was inevitable.

The advantage which the by-product oven has over the beehive lies in a number of factors:

1. The by-product coke plant can be constructed at or near the blast furnaces which are to consume its coke, and thus be under the same management.

2. It is practicable to ship to it coking coals from any section within a radius of a favorable freight rate.

3. Many coals not suitable for coking in beehive ovens become available for by-product ovens by mixing with other coals and are so used to make a first-class blast-furnace coke.

4. Coking coals in by-product ovens permits the full recovery and the use of the very valuable by-products and the gas.

5. The cost of making by-product coke at the iron and steel works is considerably less than the cost of making beehive coke at the coal mines and transporting the coke to

blast furnaces, especially those which are located some distance away from the beehive districts.

Source of Coking Coal

Coal for the manufacture of metallurgical coke is obtained from a small area in the Appalachian coal province in the United States. Pennsylvania, West Virginia, and eastern Kentucky supply most of the coking coal for the coke ovens and iron works of Pennsylvania, Ohio, and lake districts. Famous for their contribution to the iron industry are the Connellsville district in western Pennsylvania, and portions of the areas in West Virginia, Virginia, and eastern Kentucky. In the Birmingham district the Warrior coal field is the source of smelting fuel for the iron industry in Alabama.

The relationship of coking coal to iron ore is shown in the accompanying series of charts (figs. 4 to 6). Producing districts 1, 2, and 3 in the northern coal fields and producing districts 7 and 8 in the Middle Appalachian field contribute most of the coking coal, excepting only the Alabama field. The flow of coking coal from each of the two groups of producing districts is shown in figures 5 and 6. The flow charts speak for themselves. Pittsburgh, the Mahoney Valley, eastern Pennsylvania, Sparrows Point, and eastern Ohio draw their coking coal supplies from the nearby Pennsylvania and northern West Virginia fields. The Lackawanna mills near Buffalo draw from both groups of producing districts. The iron works of Ohio Michigan, Illinois, and Indiana draw heavily upon districts 7 and 8.

Coking Coal Movements to the Chicago Area

The Chicago district is a large consumer of prepared sizes of coal imported from the Appalachian fields for use in domestic heating and in small commercial and industrial establishments. The southern Appalachian district supplied nearly 60 percent of the coal sold to retail yards. This large shipment must be interpreted in connection with the predominant position of these districts

Table 23.—Coke Balance Sheet for 1947
(Thousands of dollars)

	By-product ovens	Beehive ovens
Value of coal charged	$ 790,451	$52,738
Value of coke	848,719	79,563
Value of by-products	267,126	—
Value of coke and by-products	1,115,845	79,563

in the by-product coal market of the steel centers of Illinois and Indiana. The prepared sizes of coal sold to the retail trade and the run-of-mine and screenings sold to the coking industry are joint products of the same operation. The production of one brings about the production of the other. Hence it is advantageous to develop markets for the prepared sizes that are, in a sense, by-products of the coking coal output. These markets are found in the domestic fuel requirements of the Chicago district, in eastern Wisconsin, and Minnesota. It should be noted that shipments over the lakes from southern Appalachian districts are mainly for industrial and by-product fuel and not for domestic fuel.

For example, in 1944, shipments from producing districts 7 and 8 of by-product coal and fuel for retail yards were as follows:

For retail yards	*Tons*
by rail	6,276,243
via lakes	14,120
For by-product use	
by rail	6,004,343
via lakes	5,086,629

Two factors enter into this distribution pattern. The rail-lake haul results in severe degradation and loss of merchantable coal of domestic grade. This degradation is not of much significance in coal used for industrial purposes or in the by-product oven. The second factor forming all-rail haul for the domestic sizes of coal is the ultimate destination of fuel for domestic use. In the case of the Chicago market, the coal is destined, not to the lake front as in the group of heavy fuel-using industries in the southern part of the Chicago industrial district, but to the outlying residential districts, southwest, west, and north-

west. A rail-lake haul would involve, after unloading at Chicago ports, an additional rail haul. These several transfers and separate coal hauls from mine to consumer's bin, together with the severe degradation entailed, would erase any possible economies achieved by water transportation on this particular grade of fuel. This, however, is not the case for markets as far north as eastern Wisconsin cities and the market supplied out of Duluth.

Distribution of coke.—The distribution of by-product coke is characterized by a restricted movement of coke for metallurgical use and a wide geographical distribution of coke used for other purposes. The bulk of by-product coke produced is used by producers in adjacent metallurgical works and in independent but geographically associated iron works. The remaining coke, about one-fifth of the total output, is widely distributed among several classes of customers and over a wide geographical area. The principal uses are for domestic consumption, foundries, gas making, and other industrial use.

Coke-producing districts may have a very restricted geographical market for metallurgical coke but a wide market for other uses. For example, the Alabama district ships metallurgical coke only within the borders of its own state, whereas it ships foundry coke to twenty-nine states. The Illinois district also does not ship metallurgical coke beyond its own boundaries, but ships foundry coke to nineteen states. On the other hand, Pennsylvania, leading state in coke production, sends metallurgical coke to no less than eight states and foundry coke to twenty states.

Economic Function of By-products

The recovery and sale of by-products increase substantially the realization from coke-oven operations. Besides coke, the primary by-products of the coking process are gas, tar, ammonia, and light oil. It is evident from the most cursory consideration of the by-products business that the coke industry sells to its immediate users almost nothing but fuels. Coke goes to the blast furnace or foundry; gas is sold to industrial plants or to householders for heating and cooking; tar is often sold for use as fuel. But when these or other products of coal carbonization are used for purposes other than fuel it is usually as raw materials for manufacture of other products which in turn are sold once or many times before reaching the ultimate user.

The production of one coal product is invariably accompanied by all the others. Under these circumstances the importance of properly balanced demands for coke, gas, tar, and other products is a matter of concern to the plant operator.

Relation of Fuel Cost to Pig-Iron Economy

For the past three decades, approximately 80 percent of the by-product coke manufactured in the United States has been used as blast-furnace fuel. This is an important factor in the organization of the coke industry and in the nature of the by-products market. The blast-furnace operator must be assured of a dependable supply of coke, and for these reasons alone a steel company is likely to prefer to own and operate its own coke plant. Furthermore, the cost of coke is one of the largest single factors in the cost of pig iron. Hence, maximum economy in manufacturing coke is essential.

In an integrated steel plant comprised of coke ovens, blast furnaces, and steel hearths, substantial economies can be effected by an interchange of by-products from one of the units of the integrated plant for use in the process in another of the units. For example, by-product gas from the coke oven can be used to heat the stoves and to fuel the compressor engines of the blast furnace or to supply fuel for the open-hearth steel furnace. Also, in such integrated plants, the molten pig iron may be transferred to the steel plant from the blast furnace for conversion into steel without solidifying, thereby effecting economy in heat requirements.

Since it is an exceedingly costly undertaking to begin or cease operations of a by-product oven, the manufacture of coke is somewhat inflexible and, at every depression in the steel industry, some of the metal-

lurgical companies owning coke works are likely to become sellers of coke.

In a random year of coke production, 57 million tons of coke, requiring approximately 80 million tons of coking coal, were used for the smelting of iron ore, and nearly 90 percent of this came from the northern and middle fields to smelt iron carried over the lakes from the Superior district. This fuel consumption for the prime purpose of reducing iron ore to the free metal represents an expenditure of about 15 percent of the coal output. This is not all, however. To this process of producing iron must also be charged the coal that is used in bringing the raw materials together and additional quantities of coal to carry on the conversion of iron to steel. Altogether, about one-fifth of the coal produced in the United States is used in making the first step in the vast industrial processes of the American economy—getting out of its ore iron with which to build or fabricate metal machines and goods.

Because of the large quantities of fuel needed in making iron and the bulk and tonnage of iron-bearing ore that must be moved to blast furnaces, costs can remain low only if transportation is unusually cheap, or if ores and coking coal are near together. In the United States, transportation over the lakes has played an important role in maintaining economical operations.

The significant factor of fuel costs in the production of pig iron and steel is illustrated by an analysis of these costs in the total manufacturing economy (table 24, data for 1939). Cost of fuels for blast-furnace and steel-works operation was 32 percent of the fuels used for all manufacturing operations, and purchased electrical power was 8 percent of that used for all manufactures.

An upward change in the cost of either raw materials (iron or coking coal) or transportation, or both, will be reflected by increasing costs of manufactured goods made from iron. Costs of these elements in the steel-making process have indeed risen since 1939. The changes of costs on major elements in the steel economy from 1941 to 1948 are shown in table 25.

These price increases may also include and conceal price changes that rise from changes in the character and location of coal and ore supplies. One such change is a slight decrease in the percentage of iron in the ore. The reserves of high-grade first-class iron ore in the geographically favorable Lake Superior district have reached such a point of depletion that the steel industry is seriously considering alternative sources of supply. These may be the iron-bearing taconites of this district, the supply of which is virtually inexhaustible, or the more distant but first-class iron ore of Laborador and Quebec, or Venezuela, Chile, Brazil, or West Africa. In any event, either due to required beneficiation or longer transport distances, there is likely to be an increase in cost. Exhaustion of iron supply is not apparent in the foreseeable future.

Table 24.—Comparative Costs of Fuels for All Industries and Blast Furnace and Steel Works, 1939
(In thousands of dollars)

	Number of employees	Salaries and wages	Materials and supplies	Fuel	Purchased electrical energy
All industries	9,623,000	$12,836,584	$30,254,961	$850,467	$465,426
Blast furnaces	22,000	34,498	316,775	145,500	1,444
Steel works and rolling mills	413,000	674,846	1,408,064	125,990	35,805
Total	435,000	$ 709,344	$ 1,724,839	$271,490	$ 37,249
Percentage of total	4.5%	5.5%	5.7%	32.0%	8.0%

Table 25.—Cost Changes on Major Elements in the Steel Economy, 1941, 1948
(Per ton)

	1941	1948
Iron ore prices	$4.45	$ 7.20
Coke—Chicago prices	8.02	12.97
Transportation:		
By rail—Mesabi to Duluth	0.92	1.05
By lakes—Duluth to lower lake ports	0.91	1.25
By rail—Lake Erie ports to Mahoning and Shenango valleys	0.97	1.32
By rail—eastern Kentucky coal to Chicago	3.19	3.89

With respect to coking coal, continued supply is somewhat less certain. A picture of a sustained supply of coking coal cannot be drawn for the simple reason that the extent of coal suitable for coking is unknown. All that we can be sure of is that the life of some of the famous coking coal beds, such as the Connellsville, can be measured reasonably accurately. Also the reserve of coal in the newer producing fields of southern West Virginia is measurable on the basis of present surveys. What is not known is the degree to which coking coal supplies can be extended by accepting coal of a higher sulfur content, blending coal with char, adding pitch, etc. Researches on the coking properties of coal are in progress with a view toward enlarging the supply of coal from which metallurgical coke can be obtained. Neverthless, one must not lose sight of the fact that resorting to the use of coals not now regarded as suitable for coking will in all likelihood be accompanied by increased costs.

The extent to which depletion of coking coal supplies is bringing about a shift in production is shown by the declining output in the old producing districts of southwestern Pennsylvania and the rising output in West Virginia and eastern Kentucky. An indication of the heavy draft upon the coking coal supply is the deterioration of quality which has occurred since the beginning of World War II: there has been a steady decline in the fuel efficiency of blast furnaces. According to the American Iron and Steel Institute, blast furnaces used 154.8 more pounds of coke to produce one ton of pig iron in 1947 than they did in 1941.

One aspect of the depletion of more favorably situated and better-rank coking coals is the quantity of this coal mined and not used for the manufacture of metallurgical coke. A survey made by the Bureau of Mines of coking coal produced in 1940 discloses that counties producing coking coal shipped a total of 171,440,000 tons of coal, of which 76,582,780 tons were made into coke, or about 45 percent of this total. Of this, 158,091,000 tons were produced in the Appalachian coal-producing states of Pennsylvania, West Virginia, Virginia, and Kentucky, of which 69,060,000 tons were used in coke manufacture. Exact figures are not readily available for the present period, but the use of large tonnages of the best coking coals for non-coking purposes continues as before, and is a major factor leading to depletion.

TABLE 26.—PRODUCTION OF CRUDE PETROLEUM BY STATES, 1939–1948[a]
(Thousands of barrels)

State	1939	1940	1941	1942	1943	1944	1945	1946	1947*	1948[b]
Alabama	—	—	—	—	—	43	181	380	396	466
Arkansas	21,238	25,775	26,327	26,628	27,600	29,418	28,613	28,375	29,948	31,675
California	224,354	223,881	230,263	248,326	284,188	311,793	326,482	314,713	333,132	340,089
Colorado	1,404	1,626	2,150	2,199	2,320	3,083	5,036	11,856	15,702	16,827
Florida	—	—	—	—	—	—	—	57	259	289
Illinois	94,912	147,647	132,393	106,391	82,260	77,413	75,094	75,297	66,459	64,669
Indiana	1,711	4,978	7,411	6,743	5,283	5,118	4,868	6,726	6,095	6,710
Kansas	60,703	66,139	83,242	97,636	106,178	98,762	96,415	97,218	105,132	110,833
Kentucky	5,621	5,188	4,762	4,534	7,883	9,621	10,325	10,578	9,397	8,551
Louisiana	93,646	103,584	115,908	115,785	123,592	129,645	131,051	143,669	160,128	181,181
Michigan	23,462	19,753	16,359	21,754	20,768	18,490	17,267	17,074	16,215	16,870
Mississippi	107	4,400	15,327	28,833	18,807	16,337	19,062	24,298	34,925	45,809
Montana	5,960	6,728	7,526	8,074	7,916	8,647	8,420	8,825	8,742	9,380
Nebraska	2	276	1,898	1,237	635	417	305	293	229	240
New Mexico	37,637	39,129	39,569	31,544	38,896	39,555	37,351	36,814	40,926	47,969
New York	5,098	4,999	5,185	5,421	5,059	4,697	4,648	4,863	4,762	4,621
Ohio	3,156	3,159	3,510	3,543	3,322	2,937	2,828	2,908	3,108	3,300
Oklahoma	159,913	156,164	154,702	140,690	123,152	124,616	139,299	134,794	141,019	154,032
Pennsylvania	17,382	17,353	16,750	17,779	15,757	14,118	12,515	12,996	12,690	12,667
Texas	483,528	493,209	505,572	483,097	594,343	746,699	754,710	760,215	820,210	903,318
West Virginia	3,580	3,444	3,433	3,574	3,349	3,070	2,879	2,929	2,617	2,687
Wyoming	21,454	25,711	29,878	32,812	34,253	33,356	36,219	38,977	44,772	54,004
Other states	94	71	63	45	52	69	87	84	124	95
Total United States	1,264,962	1,353,214	1,402,228	1,386,645	1,505,613	1,677,904	1,713,655	1,733,939	1,856,987	2,016,282

* Revised figures.
[a] Source: U. S. Bureau of Mines.
[b] Preliminary figures.

PETROLEUM

Production of Petroleum

The production of petroleum in the United States in 1948 was 2,016,282,000 bbl., which is 8 percent above the production in 1947, shown in table 26. This table also gives production by states for the past decade.

Illinois Production

Oil production in Illinois in 1948 was 64,669,000 bbl. This is a decrease of 3 percent from the preceding year.

A history of oil production and drilling activity for the period since the new fields were discovered is given in table 27. The

Table 27.—Illinois Well Completions and Production, 1936–1948[a]

Year	Completions[b]	Producing wells	Production (thousands of barrels)		
			New fields[c]	Old fields[c, d]	Total[e]
1936	93	52			4,445
1937	449	292	2,884	4,542	7,426
1938	2,536	2,010	19,771	4,304	24,075
1939	3,617	2,970	90,908	4,004	94,912
1940	3,755	3,080	142,969	4,678	147,647
1941	3,807	2,925	128,993	5,145	134,138
1942	2,017	1,179	101,837	4,753	106,590
1943	1,791	[f]1,090 (20)	77,581	4,675	82,256
1944	1,991	1,229 (12)	72,946	4,467	77,413
1945	1,763	1,094 (15)	70,839	4,371	75,210
1946	2,362	1,387 (17)	70,174	5,123	75,297
1947*	2,046	1,102 (22)	61,455	5,004	66,459
1948[g]	2,489	1,317 (21)	59,450	5,175	64,629

* Revised figures.
[a] Source: Illinois State Geological Survey.
[b] Includes only oil and gas producers and dry holes.
[c] Production figures based on information furnished by oil companies and pipe line companies.
[d] Includes Devonian production at Sandoval and Bartelso.
[e] From the U. S. Bureau of Mines.
[f] Figures in parenthesis refer to number of producing wells included in total which had previously been completed as dry holes.
[g] Preliminary figures.

Table 28.—Imports of Foreign Crude Petroleum, 1944–1948[a]
(Thousands of barrels)

From	1944	1945	1946	1947	1948[b]
Colombia	7,891	8,610	8,351	10,944	8,542
Curacao and Aruba	4,299	5,445	5,198	5,125	4,707
Iran	—	—	—	—	4,507
Iraq	—	—	—	—	766
Kuwait	—	—	115	111	3,442
Mexico	584	2,501	2,869	5,578	3,601
Saudi Arabia	—	—	—	275	14,466
Venezuela	32,031	57,781	69,533	75,499	89,062
Total	44,805	74,337	86,066	97,532	129,093

[a] Source: U. S. Bureau of Mines.
[b] Subject to revision.

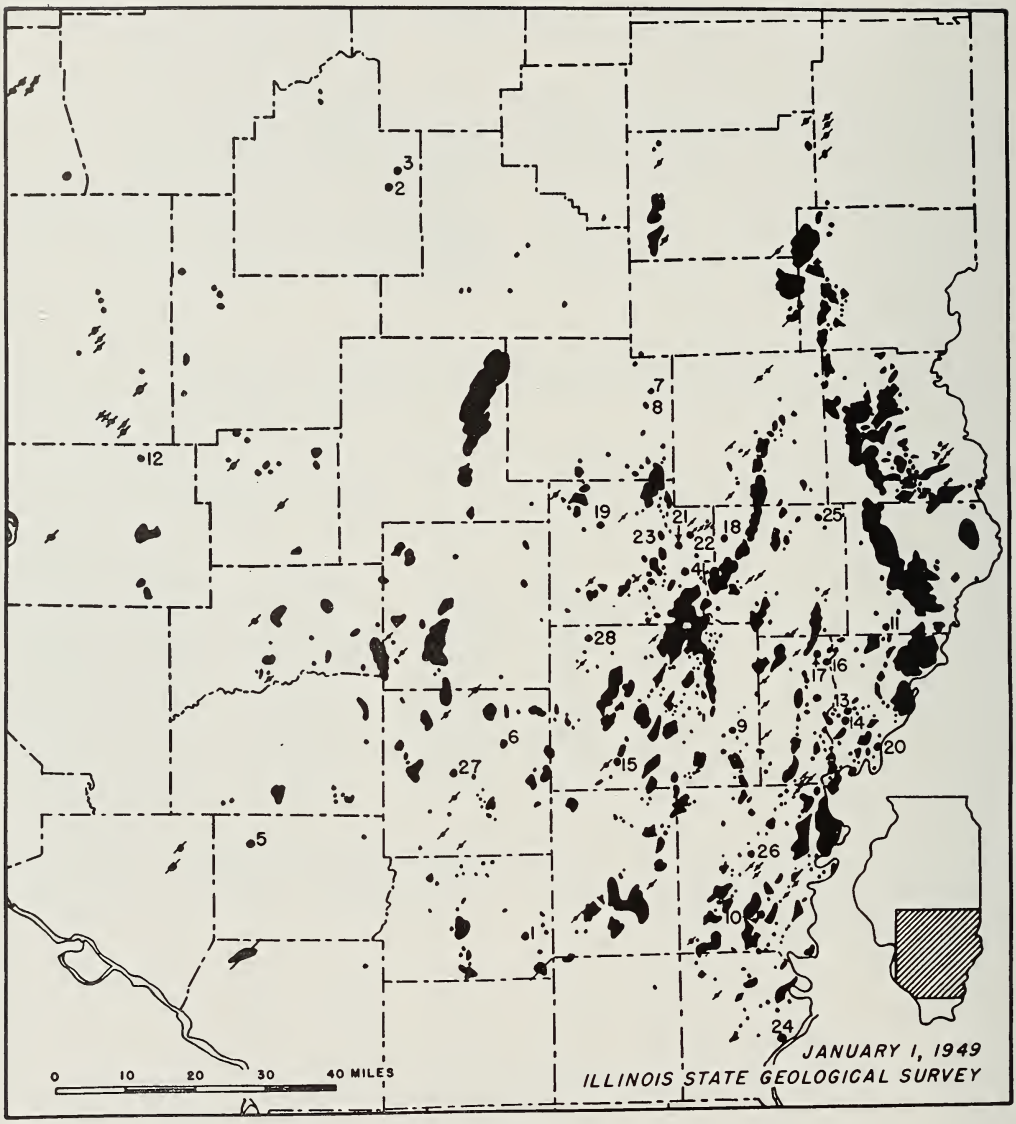

FIG. 7.—New oil pools discovered in Illinois in 1948.

1. Akin West
2. Assumption
3. Assumption North
4. Clay City North
5. Craig
6. Divide South
7. Evers
8. Evers South
9. Goldengate West
10. Herald North
11. Lancaster North
12. Livingston
13. Maud Central
14. Maud West
15. Mayberry North
16. Mills Prairie
17. Parkersburg South
18. Passport South
19. Riffle
20. Rochester
21. Sailor Springs Central
22. Sailor Springs North
23. Sailor Springs West
24. Shawneetown North
25. Stringtown East
26. Sumpter South
27. Williams
28. Zenith

Table 29.—Estimates of Proved Oil Reserves in the States Serving the Illinois Area, 1946–1949[a, b]
(Millions of barrels)

State	1946	1947	1948	1949
Illinois	350	351	355	393
Kansas	542	545	563	674
Louisiana	1,559	1,652	1,791	1,869
New Mexico	512	543	530	552
Oklahoma	889	898	953	1,250
Texas	10,835	11,646	11,778	12,484
Wyoming	600	589	679	716

[a] Source: American Petroleum Institute (figures exclude condensate as of December 31, 1945).
[b] As of January 1.

Table 30.—Gasoline Consumption in Illinois and the United States by Years, 1944–1948[a]
(Thousands of gallons)

	1944	1945	1946*	1947*	1948
Illinois total	1,166,325	1,273,244	1,643,919	1,810,447	1,970,904
United States total	24,333,689	24,435,108	30,076,662	32,732,722	35,532,022

Percent of U.S. total consumed in Illinois in 1948.....5.5%

* Revised figures.
[a] Source: American Petroleum Institute.

new fields discovered in 1948 are shown in figure 7, and Illinois production from 1905 to 1948 is shown in figure 8. The sharp rise reflects the opening of the Illinois basin fields in 1936.

Imports

Crude oil imported into the United States came mainly from Venezuela, although the Persian Gulf area also made substantial contribution. The principal supplying countries in this area are Saudi Arabia, Iran, and Kuwait. See table 28 and figure 9.

The estimates of proved oil reserves in the states serving the Illinois area as of January 1, 1949, are given in table 29. Illinois shows a slight increase from 1948.

Consumption of gasoline in Illinois and the United States for the last five years, 1944-1949, is shown in table 30.

Crude oil prices are given in table 31.

Table 31.—Crude Oil Prices[a]

Illinois—Indiana—Kentucky—Ohio	
Bowling Green, Ky. (Owensboro-Ashland, 7-1-49)	$2.42
Butler Co., Ky. (Owensboro-Ashland, 7-1-49)	2.55
Cleveland, O. and others (S. O. Ohio)	3.10
Clinton Co., Ky. (Ashland O. & T.)	2.60
Corning, O. (Seep, 5-6-49)	2.70
Eastern Illinois (Ohio Oil) 1c below Schedule F	
Hitesville, Ky. and others (Carter)	2.77
Illinois Basin (Ashland O. & R., Gulf, Magnolia, Ohio Oil, Shell, Sohio, Texaco)	2.77
Indiana Basin (Ashland O. & R., Sohio)	2.77
Lima, O. (S. O. Ohio)	2.90
London, Ill. (Carter)	2.77
Mattoon, Ill. (Carter)	2.77
Plymouth, Ill. (Ohio Oil)	2.65
Ragland Grade, Ky. (Ashland O. & T.)	2.43
Somerset Grade, Ky. (Ashland O. & T.)	2.83
Southern Illinois (Mohawk)	2.77
Western Kentucky (Sohio)	2.77

[a] National Petroleum News, Vol. 41, No. 30, July 27, 1949. (Prices effective as of Dec. 6, 1947, except as herein noted.)

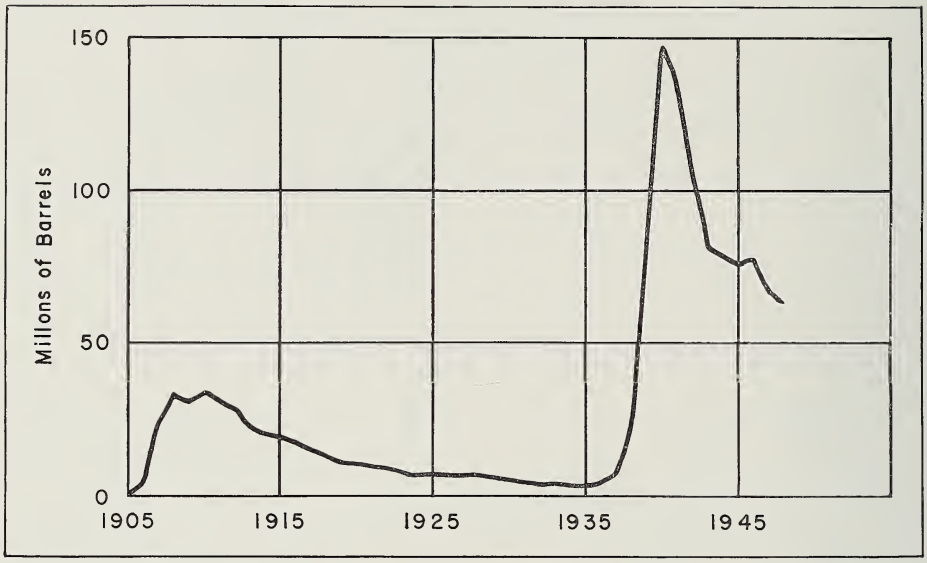

FIG. 8.—Illinois production of crude petroleum, 1905-1948.

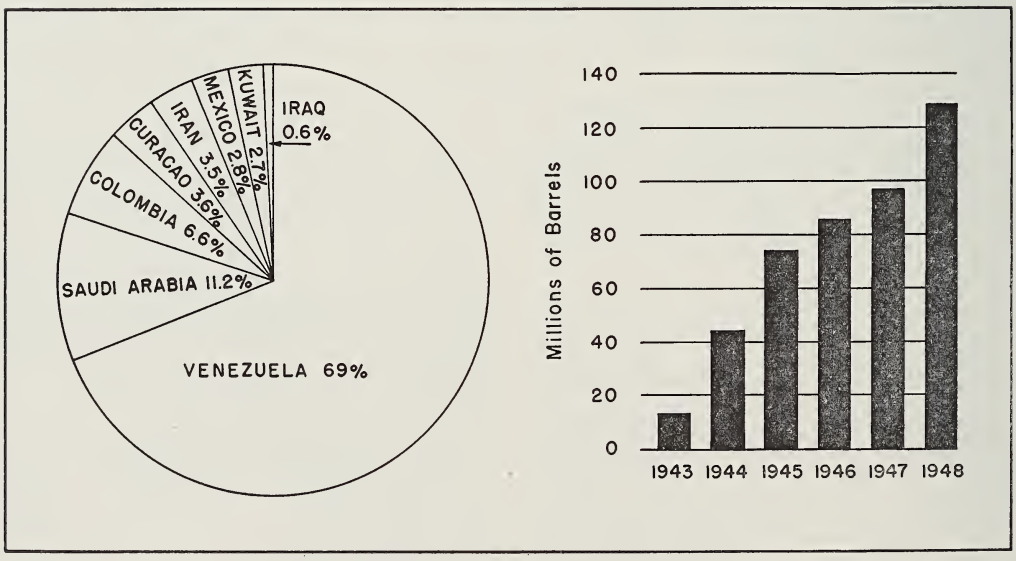

FIG. 9.—United States crude petroleum imports, 1943-1948.

STONE, ROCK PRODUCTS

Limestone, Dolomite, and Marl

The limestone, dolomite, and marl which were sold or used by producers in 1948 amounted to 18,593,000 tons, valued at the plants at $23,380,000. This was an increase of 17.8 percent in amount and 26.9 percent in value from the previous year. The average price per ton increased from $1.17 to $1.26. Details by kind and by use are given in tables 32 and 33 and are shown graphically in figure 10.

Stone for metallurgical uses and flux for chemical uses, asphalt filler, and other industrial uses showed increases in both amount and value, ranging from 9.7 percent to 50.7 percent in amount, and from 13.7 percent to 145.4 percent in value. Miscellaneous filler, other than asphalt filler, declined 68.9 percent in amount and 71.9 percent in value; concrete and paving, noncommercial operations, and stone for rough construction, showed large decreases in both amount and value. Limestone whiting increased 3.8 percent in amount, but declined 28.3 in value. All other uses increased in both quantity and value, with the highest percentage increases in dimension stone—rubble and flagging.

Stone for industrial uses was up 6.7 percent in amount and 14.6 percent in value, while that used for construction purposes showed marked increases of 25.7 percent in amount and 37.7 percent in value.

A large majority of the producers indicated the demand for stone remained strong and exceeded the supply, and many reported that labor shortage, together with higher wages and increased costs of supplies and equipment, continued to curtail production.

Some of the smaller plants closed down, a few temporarily and others permanently. A number of new operations were reported, and others changed ownership. Of the 239 plants reporting on 1948 operations, 11 percent had discontinued operations, 2 percent changed ownership, and 15 percent were idle. Several producers are enlarging their plants or installing new equipment.

Commercial and noncommercial operations.—Commercial operations are shown separately from noncommercial operations, which include the following: State of Illinois, counties, townships, municipalities, and other government agencies. Purchases by government agencies from commercial producers are included in commercial operations.

Noncommercial operations in 1948 decreased 26.5 percent in amount from the previous year, and produced 1.8 percent of the total tonnage of stone in Illinois in 1948. Of this stone 77.4 percent was used for concrete and paving, and 20.4 percent for rubble.

Agstone used in Illinois in 1948.—Reports of producers to the Illinois Geological Survey show that the quantity of agstone (ground limestone, dolomite, and marl) used for soil improvement in Illinois during 1948 amounted to more than 5,425,000 tons, valued at the plants at $7,234,000. This was an increase of 0.9 percent in tonnage and 8.2 percent in value, an average increase of nine cents per ton. Illinois continued to rank first among all the states in the amount of liming material used for soil treatment.

The value of agstone for improving soil fertility is now a well-established fact. During 1948 the demand for this mineral material became more stable, though some producers reported that it was still in excess of their production. Agstone produced in Illinois and marketed in other states declined 37.1 percent, and the amount produced in other states and used in Illinois decreased 37.3 percent (table 34).

Table 35 shows the use of agstone on Illinois farms during the years for which figures are available. During the ten-year period from 1927 to 1936, the amount used annually increased 72 percent; during the ten-year period from 1937 to 1946, the increase was 408 percent, and for the twelve-year period from 1937 to 1948, 414 percent. This remarkable growth is shown graphically in figure 11.

TABLE 32.—LIMESTONE, DOLOMITE, AND MARL, BY USES, SOLD OR USED BY PRODUCERS IN ILLINOIS, 1947–1948[a]

Use	Type of operation	1947*				1948				Percent change in amount from 1947
		Plants[b]	Amount tons	Value at plants		Plants[b]	Amount tons	Value at plants		
				Total	Av.			Total	Av.	
Industrial										
Agstone	Commercial	134	4,977,717	$ 6,306,938	$1.27	158	5,174,493	$ 6,960,527	$1.35	+ 3.9
Agstone	Noncomm.	1	508	679	1.33	1	170	226	1.33	−70.7
Metallurgical and flux[e]	Commercial	10	1,152,132	1,415,439	1.23	12	1,263,584	1,609,113	1.27	+ 9.7
Chemical uses[d]	Commercial	—	35,954	65,440	1.82	—	53,669	82,841	1.54	+49.3
Limestone whiting[e]	Commercial	2	14,503	86,526	5.97	2	15,054	62,062	4.12	+ 3.8
Asphalt filler	Commercial	5	84,823	233,084	2.75	5	127,847	571,986	4.47	+50.7
Miscellaneous filler[f]	Commercial	2	9,802	55,909	5.70	3	3,047	15,731	5.16	−68.9
Other industrial uses[g]	Commercial	6	105,107	448,679	4.27	7	130,243	571,494	4.39	+23.9
Total industrial uses	Both	137	6,380,546	8,612,694	1.35	161	6,768,107	9,873,980	1.46	+ 6.7
Construction										
Concrete and paving	Commercial	87	7,784,655	8,298,508	1.06	122	9,748,766	11,466,145	1.18	+25.2
Concrete and paving	Noncomm.	10	454,999	370,162	.81	7	259,208	206,660	.80	−43.0
Railroad ballast	Commercial	16	807,496	707,158	.88	17	986,765	919,614	.93	+22.2
Riprap	Commercial	22	158,355	194,255	1.23	24	158,347	230,840	1.46	—
Riprap	Noncomm.	—	—	—	—	3	68,505	64,226	.94	—
Rough construction	Commercial	3	2,936	3,990	1.36	3	788	838	1.06	−73.2
Rubble	Commercial	4	2,156	5,873	2.72	5	14,712	21,188	1.44	+582.4
Rubble	Noncomm.	1	200	400	2.00	—	—	—	—	—
Flagging	Commercial	4	817	2,652	3.25	5	2,677	7,136	2.67	+227.7
Other construction uses[h]	Commercial	7	194,219	228,397	1.18	10	577,947	580,977	1.01	+197.6
Other construction uses[i]	Noncomm.	—	—	—	—	1	7,220	8,158	1.13	—
Total construction uses	Both	99	9,405,833	9,811,395	1.04	141	11,824,935	13,505,782	1.14	+25.7
Total operations	Commercial	146	15,330,672	18,052,848	1.18	171	18,257,939	23,100,492	1.27	+19.1
Total operations	Noncomm.	11	455,707	371,241	.81	9	335,103	279,270	.83	−26.5
Total stone	Both	157	15,786,379	$18,424,089	$1.17	180	18,593,042	$23,379,762	$1.26	+17.8

* Revised figures.
[a] Summary of joint canvass made by Illinois Geological Survey and U. S. Bureau of Mines.
[b] Number of plants reporting production.
[c] Includes refractory dolomite, flux for blast furnaces and open-hearth plants, and stone for aluminum refining and for other metallurgical uses.
[d] Includes stone for alkali works, glass factories, and other chemical uses.
[e] Includes limestone whiting for caulking compounds, grease, kalsomine, picture-frame moldings, pottery, tooth paste, and for paint, putty, rubber, and other fillers; excludes asphalt filler.
[f] Includes pulverized stone for fertilizer and other fillers.
[g] Includes stone for lime manufacturing, mineral food, and regrinding, and dust for coal mines.
[h] Includes building stone, chips for driveways, stone sand, and stone for filter beds and other uses.
[i] Unspecified uses.

TABLE 33.—LIMESTONE, DOLOMITE, AND MARL, BY KINDS AND BY USES, SOLD OR USED BY PRODUCERS IN ILLINOIS, 1948[a]

Use	Type of operation	Limestone				Dolomite			
		Plants[b]	Amount tons	Value at plants		Plants[b]	Amount tons	Value at plants	
				Total	Av.			Total	Av.
Industrial									
Agstone	Commercial	91	3,163,184	$ 4,533,626	$1.43	66	2,008,817	$ 2,424,409	$1.21
Agstone-marl	Commercial	1	2,492	2,492	1.00	—	—	—	—
Agstone	Noncomm.	1	170	226	1.33	—	—	—	—
Metallurgical and flux	Commercial	6	[c]371,816	[c]538,494	1.45	6	[d]891,768	[d]1,070,619	1.20
Chemical uses	Commercial	—	53,669	82,841	1.54	—	—	—	—
Limestone whiting	Commercial	2	[e]15,054	[e]62,062	4.12	—	—	—	—
Miscellaneous filler	Commercial	3	[f]10,561	[f]72,304	6.85	3	[f]120,333	[f]515,413	4.28
Other industrial uses	Commercial	5	[g]102,816	[g]534,867	5.20	2	[h]27,427	[h]36,627	1.34
Total industrial uses	Both[l]	94	3,719,762	5,826,912	1.57	67	3,048,345	4,047,068	1.33
Construction									
Concrete and paving	Commercial	72	3,959,462	4,841,792	1.22	50	5,789,304	6,624,353	1.14
Concrete and paving	Noncomm.	3	16,251	14,589	.90	4	242,957	192,071	.66
Railroad ballast	Commercial	3	39,100	53,406	1.37	14	947,665	866,208	.91
Riprap	Commercial	21	142,014	213,193	1.50	3	16,333	17,647	1.08
Riprap	Noncomm.	1	12,800	12,800	1.00	2	55,705	51,426	.92
Rough construction	Commercial	3	788	838	1.06	—	—	—	—
Rubble	Commercial	4	12,292	19,876	1.62		([i])	([i])	
Flagging	Commercial	3	1,590	3,424	2.15	3	3,507	5,024	1.43
Other construction uses	Commercial	5	[j]333,864	[j]352,881	1.06	5	[k]244,083	[k]228,096	.93
Other construction uses	Noncomm.	1	[l]7,220	[l]8,158	1.13	—	—	—	—
Total construction uses	Both	81	4,525,381	5,520,957	1.22	60	7,299,554	7,984,825	1.09
Total operations	Commercial	98	8,208,702	11,312,096	1.38	73	10,049,237	11,788,396	1.17
Total operations	Noncomm.	3	36,441	35,773	.98	6	298,662	243,497	.82
Total stone	Both	101	8,245,143	$11,347,869	$1.38	79	10,347,899	$12,031,893	$1.16

[a] Summary of joint canvass made by Illinois Geological Survey and U. S. Bureau of Mines.
[b] Number of plants reporting production.
[c] Includes flux for open-hearth plants and blast furnaces, and stone for other metallurgical uses.
[d] Includes refractory dolomite for open-hearth plants and flux for blast furnaces.
[e] Includes limestone whiting for caulking compounds, grease, kalsomine, picture-frame mouldings, pottery, tooth paste, and for paint, putty, rubber, and other fillers.
[f] Includes pulverized stone for asphalt, fertilizer, and other fillers.
[g] Includes stone for lime manufacturing, mineral food, and dust for coal mines.
[h] Includes stone for mineral food, regrinding, and dust for coal mines.
[i] Included in flagging.
[j] Includes chips for driveways, building stone, stone sand, and stone for other uses.
[k] Includes chips for driveways, building stone, stone sand, and stone for filter beds and other uses.
[l] Unspecified uses.

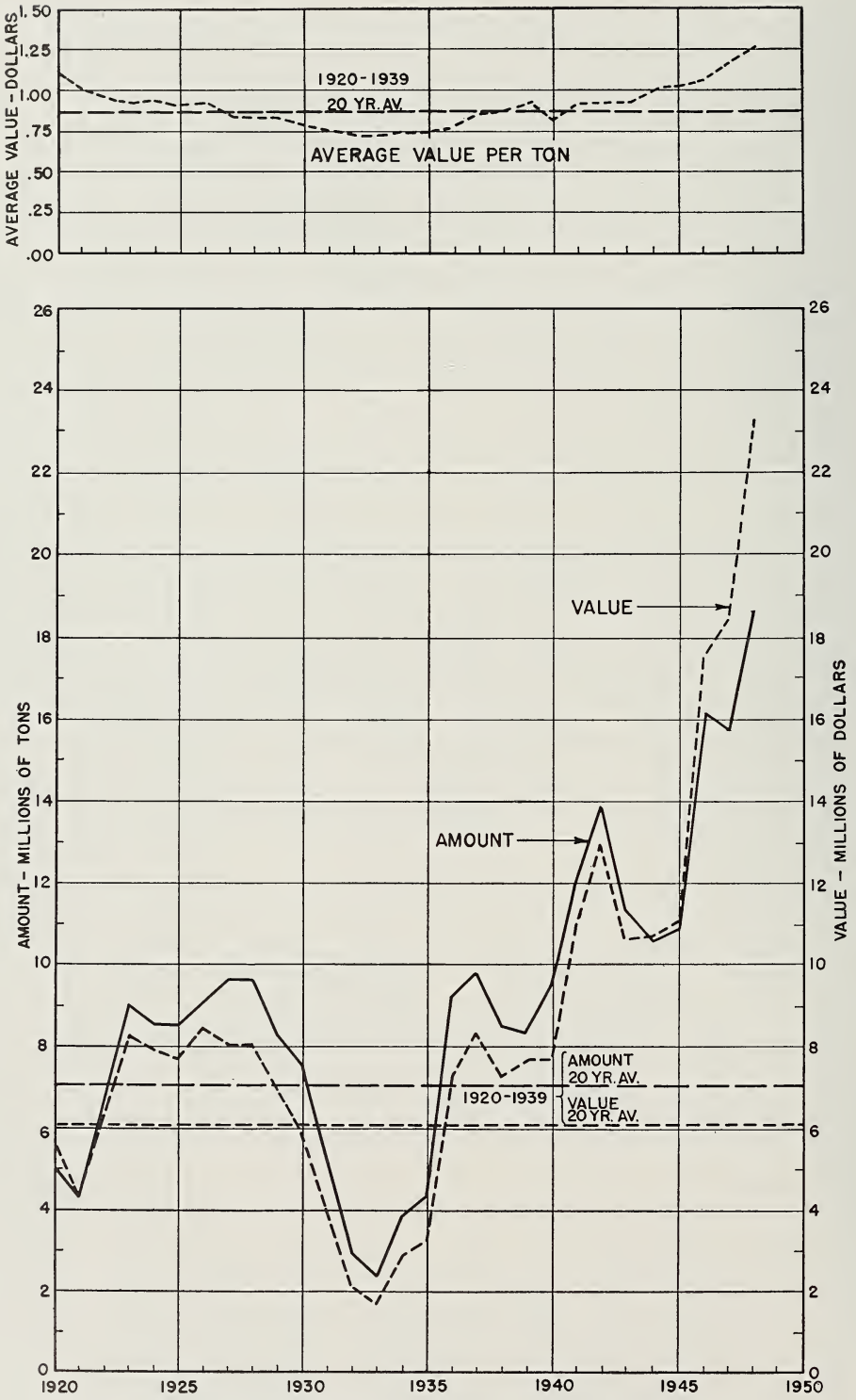

FIG. 10.—Annual production of limestone, dolomite, and marl in Illinois, 1920-1948.

TABLE 34.—AGSTONE USED IN ILLINOIS, 1947–1948[a]

Agstone	1947*				1948				
	Plants[b]	Amount tons	Value at plants		Plants[b]	Amount tons	Value at plants		Percent change in amount from 1947
			Total	Av.			Total	Av.	
Produced in Illinois									
Limestone	76	3,025,582	$4,049,066	$1.34	91	3,163,184	$4,533,626	$1.43	+ 4.5
Dolomite	57	1,948,135	2,253,672	1.17	66	2,008,817	2,424,409	1.21	+ 3.1
Marl	1	4,000	4,200	1.05	1	2,492	2,492	1.00	−37.7
Total produced in Illinois	134	4,977,717	6,306,938	1.27	158	5,174,493	6,960,527	1.35	+ 4.0
Less marketed in other states	14	91,663	112,348	1.23	11	57,705	78,248	1.36	−37.1
Produced and used in Illinois	134	4,886,054	6,194,590	1.27	158	5,116,788	6,882,279	1.35	+ 4.7
Produced in other states and used in Illinois	12	494,357	488,620	.99	12	310,129	351,685	1.13	−37.3
Total agstone used in Illinois	146	5,380,411	$6,683,210	$1.24	170	5,426,917	$7,233,964	$1.33	+ 0.9

* Revised figures.
[a] Summary of canvass made by Illinois Geological Survey in cooperation with Illinois Agricultural Association and Midwest Limestone Institute.
[b] Number of plants reporting production.

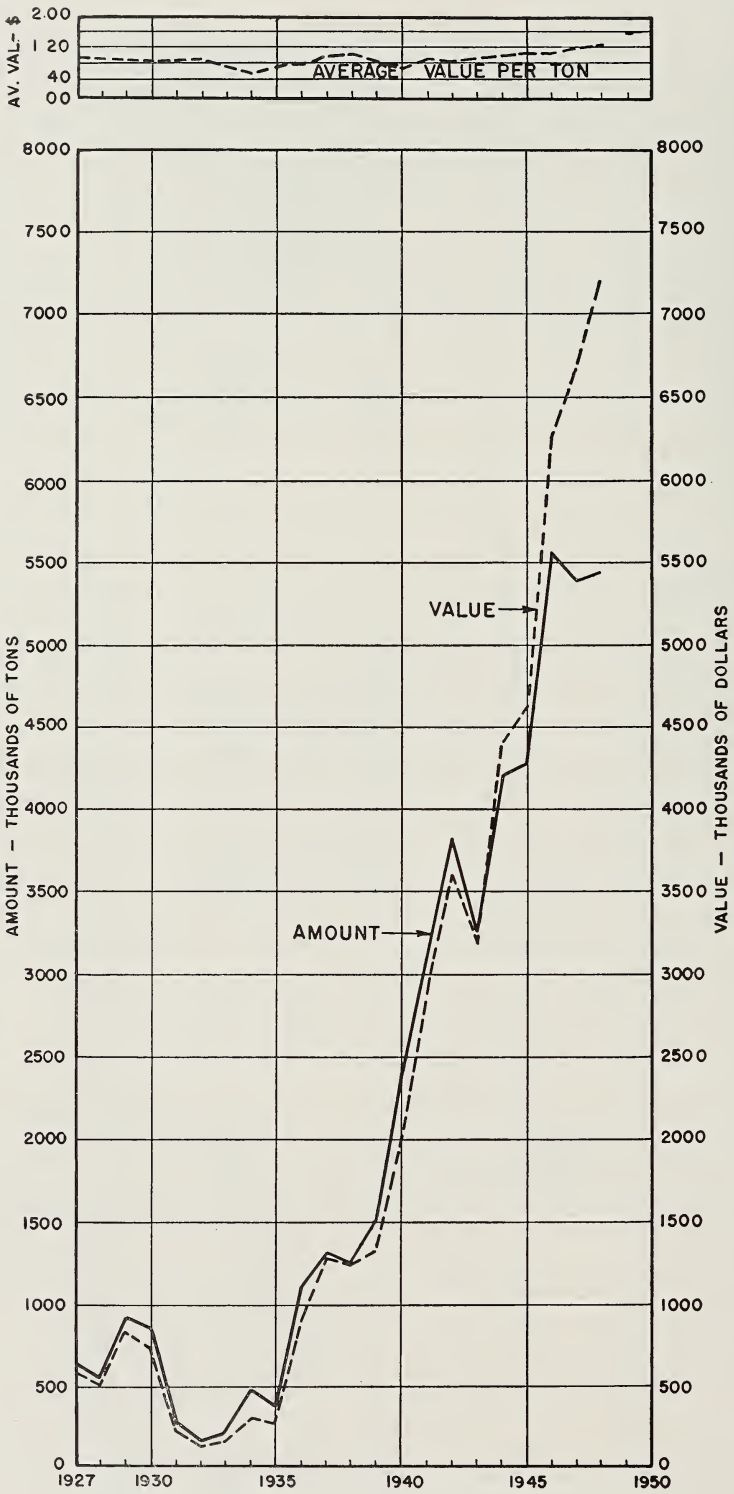

FIG. 11.—Annual use of agstone in Illinois, 1927-1948.

TABLE 35.—AGSTONE USED IN ILLINOIS ANNUALLY, 1927–1948[a]

Year	Tons	Value	Av. price per ton
1927	647,155	$ 579,639	$0.90
1928	565,001	511,005	.91
1929	947,798	843,693	.89
1930	868,426	740,785	.86
1931	268,874	241,376	.90
1932	164,933	140,969	.86
1933	227,466	165,667	.73
1934	491,644	319,604	.65
1935	379,555	268,139	.71
1936	1,114,466	871,862	.78
1937	1,310,513	1,279,981	.97
1938	1,251,263	1,247,150	1.00
1939	1,497,458	1,318,173	.88
1940	2,365,663	1,999,580	.84
1941	3,084,855	2,873,536	.93
1942	3,866,568	3,600,313	.93
1943	3,236,477	3,175,108	.98
1944	4,214,600	4,388,886	1.04
1945	4,287,568	4,627,705	1.08
1946	5,595,699	6,262,247	1.12
1947	*5,380,411	*6,683,210	*1.24
1948	5,426,917	7,233,964	1.33

* Revised figures.
[a] U. S. Bureau of Mines, 1927-29; canvass by Illinois Agriculture Association 1930; canvass by Illinois Geological Survey, 1931-1948.

TABLE 36.—PORTLAND CEMENT PRODUCED, SHIPPED, AND USED IN ILLINOIS, 1947 AND 1948[a]
(In thousands of barrels of 376 pounds each)

Portland cement	1947*	1948	Percent change from 1947
Finished Portland cement produced	7,228	7,571	+ 4.8
Finished Portland cement shipped from mills	7,155	7,574	+ 5.9
Value of cement shipped (in thousands of dollars)	$13,219	$15,201	+15.0
Stocks of finished Portland cement, December 31	484	481	—
Cement used in Illinois	9,333	10,580	+13.4

* Revised figures.
[a] Source: U. S. Bureau of Mines.

During 1948 agstone was produced in 53 of the 102 counties of the State. Of the total used during the year, 94.3 percent was produced in Illinois.

Cement.—During 1948 production of cement in Illinois amounted to 7,571,000 barrels valued at $15,201,000. The State continues to import cement, since consumption in 1948 was 10,580,000 barrels.

Lime.—Sales of lime by producers in Illinois in 1948 amounted to 285,700 tons, valued at the plants at $3,014,000, as shown in table 37. Of this tonnage 88 percent was quicklime and sintered dolomite, and 12 percent was hydrated lime.

Total lime decreased 4.5 percent in amount from 1947, but increased 10.1 percent in value, an average price increase of $1.40 per ton. Quicklime and sintered dolomite declined 3.8 percent in amount but showed an increase of 10.8 percent in value, while hydrated lime dropped 9.3 percent in amount, and increased 5.4 percent in value. The average price of quicklime and sintered dolomite showed an increase of $1.39 per ton, and hydrated lime increased $1.49 per ton.

Sales of quicklime for building lime increased 18.8 percent in amount and 6.3 percent in value, and hydrated building lime increased 1.9 percent in quantity and 17.5 percent in value. Sintered dolomite and metallurgical lime showed increases of 8.8 percent in amount and 24 percent in value. Sales of quicklime for chemical and industrial uses declined 26.2 percent in amount and 12.4 percent in value. Hydrated lime for these same uses dropped 10 percent in amount but increased 4.7 percent in value. Under chemical and industrial uses is included lime for water purification and softening, sewage and trade-wastes treatment, insecticides, fungicides, and disinfectants, petroleum refining, tanneries, grease, glue, paper manufacturing, and for other purposes.

Annual shipments of lime by producers in Illinois are shown graphically in figure 12, beginning with 1920, compared to the 20-year average which is based on shipments for 1920-1939 inclusive.

TABLE 37.—LIME SOLD OR USED BY PRODUCERS IN ILLINOIS, 1947–1948[a]

Kind and use	1947*				1948				
	Plants[b]	Amount tons	Value at plants		Plants[b]	Amount tons	Value at plants		Percent change in amount from 1947
			Total	Av.			Total	Av.	
Quicklime and sintered dolomite									
Building lime	4	13,186	$ 135,716	$10.29	3	[c] 15,670	$ [c]144,210	$ 9.20	+18.8
Sintered dolomite and metallurgical lime	4	150,448	1,478,531	9.83	5	163,623	1,825,601	11.16	+ 8.8
Other chemical and industrial uses	4	98,090	778,309	7.93	4	72,433	681,783	9.41	−26.2
Total	7	261,724	2,392,556	9.14	7	251,726	2,651,594	10.53	− 3.8
Hydrated lime									
Building lime	3	2,213	20,780	9.43	3	2,256	24,408	10.82	+ 1.9
Chemical and industrial uses	4	35,250	322,926	9.16	3	31,724	337,969	10.65	−10.0
Total	4	37,463	343,706	9.17	3	33,980	362,377	10.66	− 9.3
Total lime	7	299,187	$2,736,262	$ 9.15	7	285,706	$3,013,971	$10.55	− 4.5

* Revised figures.
[a] Summary of joint canvass made by Illinois Geological Survey and U. S. Bureau of Mines.
[b] Number of plants reporting production.
[c] Partly estimated.

Ganister and sandstone.—Ganister is a siliceous material found in Union and Alexander counties of southern Illinois. It is used for refractory purposes.

Sandstone and miscellaneous stone are produced in various parts of the State for road work, and for foundations, riprap, and rubble, mostly by noncommercial operations.

Total sales and uses of ganister, sandstone, and miscellaneous stone by producers in Illinois are given in table 38. The figures show a radical decrease in both amount and value from previous years.

TABLE 38.—GANISTER AND SANDSTONE SOLD OR USED BY PRODUCERS IN ILLINOIS, 1944-1948[a]

Year	Amount tons[b]	Value at plants	
		Total	Average
1944	548	$ 4,774	$ 8.71
1945	8,573	10,791	1.26
1946	8,336	10,900	1.30
1947	16,299	18,757	1.15
1948	200	1,000	5.00

[a] Summary of joint canvass made by Illinois Geological Survey and U. S. Bureau of Mines.
[b] Includes ganister for refractory purposes and sandstone for road work, and for foundations, riprap, and rubble.

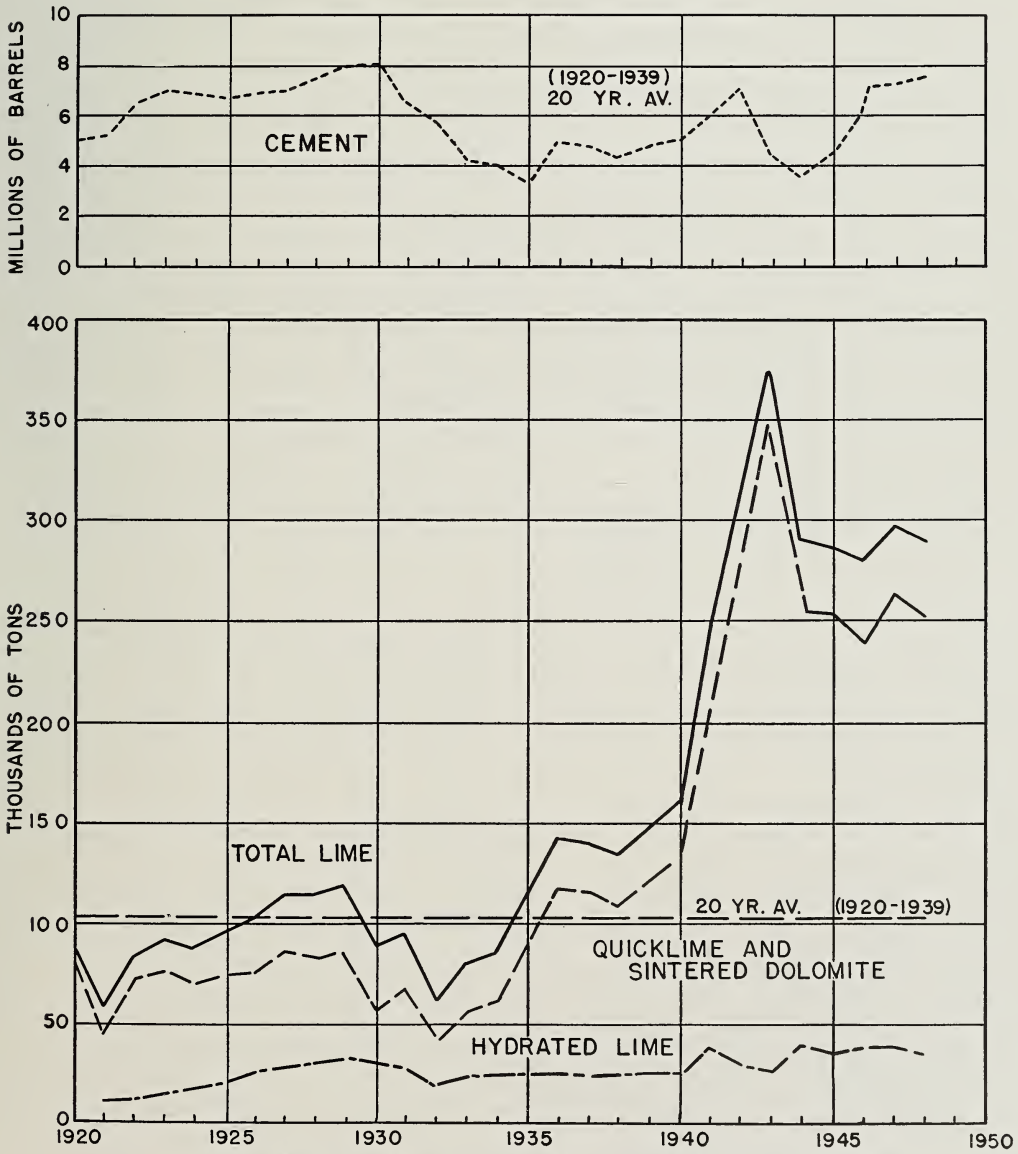

FIG. 12.—Annual shipments of cement and lime by producers in Illinois, 1920-1948.

CLAYS, CLAY PRODUCTS

Clays and clay products (including fuller's earth and silica refractories) sold and shipped by producers in Illinois in 1948 were valued at the plants at $44,700,000, an increase of 32.5 percent over 1947, and retained the position as the third largest mineral industry in Illinois, ranking next to coal and petroleum.

The two main factors in establishing this all-time high record were the increased demand of the construction industry for these types of material, and the almost 100 percent cooperation of the producers in submitting their figures. Reports of 1948 production from producers who did not submit figures on 1947 operations comprised 20 percent of the total increase in value, which amounted to more than $10,950,000, whereas the value of increased production of producers who did participate in the 1947 report accounted for 80 percent of this large increase.

All groups in the clays and clay products classification contributed to this outstanding record, as shown by the following percentage increases in value from 1947 (tables 39 and 40):

Clays—29.1 percent
Refractories—17.0 percent
Structural products—34.3 percent
Whiteware and pottery—39.4 percent

Clays, Including Fuller's Earth

In 1948, clays (including fuller's earth) which were sold and shipped as such amounted to 261,200 tons, valued at the mines or pits at $1,293,400, an increase of 9.4 percent in quantity and 29.1 percent in value over the previous year, as shown in table 39. Clays used by their producers in the manufacture of clay products at their own plants are not included, but are reported in the resultant clay products in table 40.

Sales of fire clay totaled 192,100 tons, valued at the plants at $817,700, an increase of 14.1 percent in amount and 48 percent in value over 1947. Sales of stoneware clay decreased 43 percent in amount and 30.3 percent in value, but the average price per ton was 48 cents more than in the previous year. Shale and surface clay are grouped under one heading because there were less than three producers reporting sales of each of these types of clay, and separate figures could not be shown without revealing individual operations. For the same reason fuller's earth and kaolin are combined. Fuller's earth is used for oil refining, oil absorbents, fillers, and bonding foundry sands.

Ceramic uses of clays sold and shipped as such in 1948 amounted to 181,700 tons, valued at the mines or pits at $527,300, an increase of 7.4 percent in quantity and 18.7 percent in value over the preceding year. These clays for ceramic purposes comprised 69.6 percent in amount and 40.8 percent in value of the total clays sold and shipped in 1948. The largest ceramic use was for refractories, which represented 77.5 percent of the tonnage and 84.7 percent of the value of clays thus used.

Nonceramic uses of clays in 1948 totaled 79,500 tons, valued at the plants at $766,000, an increase of 14.2 percent in amount and 37.3 percent in value over the previous year. These uses included bonding foundry sands, fillers, and oil refining.

Clay Products, Including Silica Refractories

Clay products (including silica refractories) sold and shipped by producers in Illinois in 1948 were valued at the plants at $43,406,200, an increase of 32.6 percent over 1947, establishing an all-time high record. Refractories represented 19 percent of the value of clay products sold, which was 3 percent less than in 1947; sales of structural clay products comprised 40 percent, 1 percent more than in the previous year; and whiteware and pottery amounted to 41 percent of the total sales, an increase of 2 percent from 1947 (table 40).

Refractories.—Refractories, clay and silica, totaled 262,800 tons, valued at the plants at $8,281,500, an increase of 3.7 percent in amount and 17 percent in value over

TABLE 39.—CLAYS (INCLUDING FULLER'S EARTH) SOLD AND SHIPPED BY PRODUCERS IN ILLINOIS, BY KINDS AND BY USES, 1947–1948[a]

Kind and use	1947				1948					
	Plants[b]	Amount tons	Value at plants		Plants[b]	Amount tons	Value at plants		Percent change in amount from 1947	Percent change in value from 1947
			Total	Av.			Total	Av.		
Kind										
Fire clay	4	168,381	$ 552,562	$ 3.27	6	192,090	$ 817,738	$ 4.26	+14.1	+48.0
Shale and surface clay	*3	* 19,924	* 22,756	*1.14	3	23,567	34,511	1.46	+18.3	+51.7
Stoneware clay	4	11,724	25,409	2.17	4	6,678	17,701	2.65	−43.0	−30.3
Other clays[c]	*3	*38,736	*401,493	*10.36	3	38,870	423,435	10.89	+ .3	+ 5.5
Total clays sold and shipped	13	238,765	1,002,220	4.20	14	261,205	1,293,385	4.95	+ 9.4	+29.1
Use										
Ceramic										
Refractories[d]	*6	*131,480	*385,867	*2.93	6	140,854	446,499	3.17	+ 7.1	+15.7
Structural products	2	21,238	25,803	1.22	3	28,053	44,305	1.58	+32.1	+71.7
Whiteware and pottery	6	16,481	32,713	1.98	6	12,820	36,533	2.85	−22.2	+11.7
Total ceramic uses	12	169,199	444,383	2.63	12	181,727	527,337	2.90	+ 7.4	+18.7
Nonceramic										
Miscellaneous uses[e]	3	69,566	557,837	8.02	4	79,478	766,048	9.64	+14.2	+37.3
Total clays sold and shipped	13	238,765	$1,002,220	$ 4.20	14	261,205	$1,293,385	$ 4.95	+ 9.4	+29.1

* Revised figures.
[a] Summary of joint canvass made by Illinois Geological Survey and U. S. Bureau of Mines.
[b] Number of plants reporting production.
[c] Includes kaolin and fuller's earth.
[d] Includes clay for laying and daubing, foundries, fire clay mortar, and clay crucibles.
[e] Includes clay for fillers, bonding foundry sands, and oil refining.

TABLE 40.—CLAY PRODUCTS (INCLUDING SILICA REFRACTORIES) SOLD AND SHIPPED BY PRODUCERS IN ILLINOIS, 1947–1948[a]

Kind and use	1947				1948					
	Plants[b]	Amount tons	Value at plants		Plants[b]	Amount tons	Value at plants		Percent change in amount from 1947	Percent change in value from 1947
			Total	Av.			Total	Av.		
Refractories, clay and silica										
Firebrick and shapes	8	215,155	$ 6,053,689	$28.14	7	219,860	$ 6,867,329	$31.24	+ 2.1	+ 13.4
Plastic and castable refractories	4	12,271	455,365	37.11	4	13,723	733,130	53.42	+ 11.8	+ 60.6
Cements and mortars	6	7,678	373,938	48.70	6	8,062	482,792	59.88	+ 5.0	+ 29.1
Other refractories	4	18,304	191,782	10.48	4	21,226	198,218	9.34	+ 10.5	+ 3.4
Total refractories	10	253,408	7,074,774	27.92	11	262,871	8,281,469	31.50	+ 3.7	+ 17.0
Structural clay products		thous.				thous.				
Common brick	27	324,602	5,346,270	16.47	24	401,659	7,234,046	14.99	+ 23.7	+ 35.3
Face brick	19	137,740	3,406,549	24.73	15	160,403	4,526,560	28.22	+ 16.5	+ 32.9
Paving block	2	1,253	44,210	35.29	—	—	—	—	—	—
		tons				tons				
Total (in equivalent tons)	32	1,160,241	8,797,029	7.58	27	1,405,155	11,760,606	8.36	+ 21.1	+ 33.7
Drain tile	16	116,191	1,313,714	11.31	17	155,716	1,926,500	12.39	+ 34.0	+ 46.6
Structural tile	17	73,480	710,179	9.66	13	66,069	662,073	10.02	− 10.1	− 6.8
Sewer pipe, flue lining, wall coping	3	33,212	974,429	29.34	3	32,626	1,044,220	32.00	− 1.8	+ 7.2
Terra cotta and glazed block[c]	—	—	—	—	—	—	—	—	—	—
Other structural products	7	92,655	1,010,947	10.91	5	121,322	1,807,140	14.90	+ 30.9	+ 78.8
Total structural products	47	1,475,779	12,806,298	8.68	43	1,780,904	17,200,539	9.66	+ 20.7	+ 34.3
Whiteware and pottery										
Earthenware (flowerpots)	3	—	321,932	—	3	—	329,032	—	—	+ 2.2
Stoneware	4	—	1,477,321	—	3	—	1,122,449	—	—	− 24.0
Garden pottery[d]	—	—	—	—	—	—	—	—	—	—
Dinnerware and art china	3	—	216,229	—	3	—	1,331,229	—	—	+515.7
Art pottery	5	—	2,897,680	—	4	—	3,124,277	—	—	+ 7.8
Vitreous-china plumbing fixtures	3	—	6,454,944	—	3	—	9,901,865	—	—	+ 53.4
Porcelain and other whiteware	2	—	1,491,557	—	3	—	2,115,323	—	—	+ 41.9
Total whiteware and pottery	16	—	12,859,663	—	17	—	17,924,175	—	—	+ 39.4
Total clay products	72	—	32,740,735	—	70	—	43,406,183	—	—	+ 32.6
Total clays and clay products (Tables 39 and 40)	79	—	$33,742,955	—	80	—	$44,699,568	—	—	+ 32.5

[a] Summary of canvass made by Illinois Geological Survey.
[b] Number of plants reporting production.
[c] Included in "Other structural products."
[d] Included in "Dinnerware and art china."

1947, and reflected an average rise of $3.58 per ton. All refractory products increased both in quantity and value over 1947. Plastic and castable refractories showed the highest percentage increases, 11.8 percent in amount, and 60.6 percent in value. Fire brick and shapes comprised 83.6 percent of the total tonnage and 82.9 percent of the total sales of refractory products for 1948.

Structural clay products.—Structural clay products amounted to 1,780,900 tons, valued at the plants at $17,200,500, an increase of 20.7 percent in quantity and 34.3 percent in value from 1947, and represented an average rise of 98 cents per ton. Greater demand and more complete returns combined to effect this large increase.

Common bricks sold were valued at the plants at $7,234,000, an increase of 35.3 percent in value from 1947, although the average price per thousand declined $1.48.

Face brick sold in 1948 totaled $4,526,600. This was an increase of 32.9 percent in value over 1947, and an average gain of $3.49 per thousand.

Drain tile sold in 1948 amounted to 155,700 tons, valued at the plants at $1,926,500. This was an increase of 34 percent in amount and 46.6 percent in value over 1947.

Structural tile sold totaled 66,100 tons, was valued at the plants at $662,100, showing a decrease of 10.1 percent in amount and 6.8 percent in value.

Sewer pipe, flue lining, and wall coping sold amounted to 32,600 tons and were valued at the plants at $1,044,200, a decrease of 1.8 percent in amount, but an increase of 7.2 percent in value.

Other structural products include facing block, haydite, terra cotta, and glazed block. These products, totaling 121,300 tons, were valued at $1,807,100 and showed increases of 30.9 percent in amount and 78.8 percent in value over 1947.

Whiteware and pottery.—Whiteware and pottery sold and shipped by producers in Illinois in 1948 were valued at $17,924,200. This exceeded by 39.4 percent the previous all-time high record of whiteware and pottery sales established in 1947.

Earthenware (flowerpots), valued at $329,000, showed an increase of only 2.2 percent after leading the whiteware group in 1947 with an 85 percent increase in sales.

Stoneware was valued at $1,122,400, a decrease of 24 percent, and was the only product in the whiteware group to show a decrease in sales.

Art china, dinnerware, and garden pottery are grouped under one heading, as there were less than three producers reporting sales of each of these products, and separate figures could not be shown without revealing individual operations. These combined products showed the largest percentage increase in value from 1947—515.7 percent—due to more complete returns covering these items.

Art pottery sold in 1948 was valued at $3,124,300, an increase of 7.8 percent over 1947.

Vitreous-china plumbing fixtures valued at $9,901,900 showed a gain of 53.4 percent in value over the previous year and amounted to 55.2 percent of the total sales of whiteware for 1948.

Other whiteware and pottery included electric porcelain, chemical stoneware, and miscellaneous products. Valued at $2,115,300, these showed an increase of 41.9 percent over 1947.

Value of annual sales of clays and clay products by producers in Illinois for the years 1939-1948 are shown graphically in figure 13.

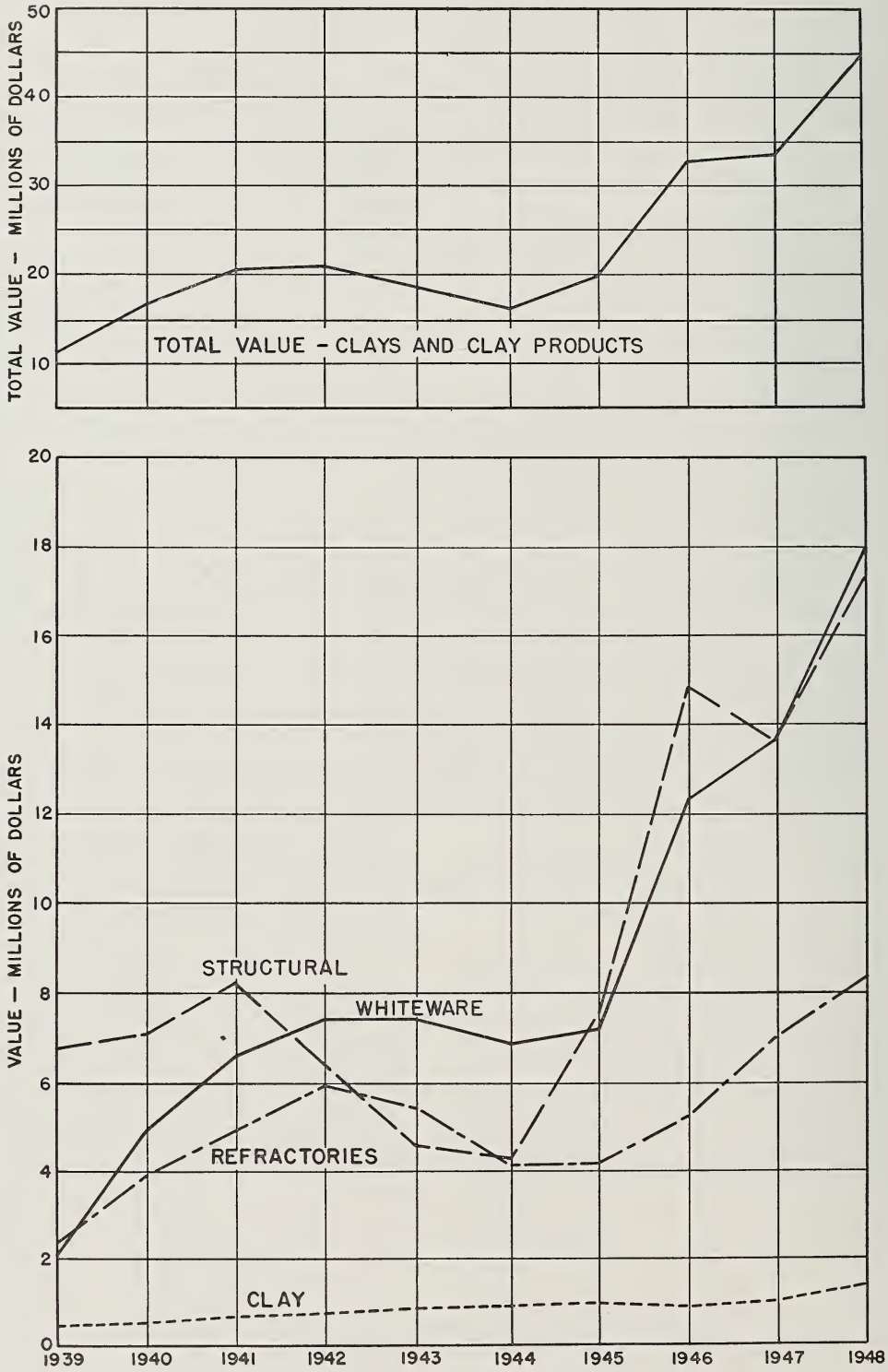

FIG. 13.—Value of annual sales of clays and clay products by producers in Illinois, 1939-1948.

SAND AND GRAVEL

Silica Sand

The amount of silica sand sold or used by producers in Illinois in 1948 totaled 2,504,500 tons, valued at the plants at $4,795,600, as shown in table 41. This was a decrease of 1.2 percent in amount, although the value showed an increase of 10.2 percent, an average gain of 19 cents per ton over 1947. Illinois ranks first among all the states in the production of this mineral material.

Silica sand is used almost entirely for industrial purposes, and in 1948 less than 1 percent of that sold or used by producers in Illinois was for construction work. Total industrial uses decreased 0.8 percent in amount and increased 10.5 percent in value. Steel molding sand increased 19.3 percent in amount and 37.5 percent in value, an increase of 22 cents per ton, and made up 47.6 percent of the total tonnage of silica sand sold or used in 1948. Blast sand, grinding and polishing sand, and engine and filter sands showed increases in both amount and value, while all other uses declined in amount and value.

Other Sand and Gravel

Sand (other than silica sand) and gravel sold or used by producers in Illinois in 1948 amounted to 15,091,700 tons, and was valued at the plants at $10,193,100, an increase of 17.8 percent in amount and 28.6 percent in value over the previous year. This is the largest tonnage of this material reported since 1930, and the average value of 68 cents per ton is the highest recorded since 1920.

Several producers reported a high demand for road gravel due to the large amount of money granted by the State to townships for road improvement, and many stated that they had produced and sold, under contract, both sand and gravel for State, county, city, and township projects. According to some producer reports, though sand and gravel prices are higher, they have not kept pace with the cost of production (labor, repairs, and supplies), which has increased considerably.

Of the total tonnage of sand (other than silica sand) and gravel reported in 1948, 6.1 percent was from government-and-contractor operations, which includes the State of Illinois, counties, townships, and municipalities, produced either by themselves or by contractors expressly for their use. Purchases by government agencies from commercial producers are included in commercial operations.

"Other sand" amounted to 5,738,400 tons, and was valued at the plants at $4,133,700, an increase of 26.5 percent in amount from 1947. Structural sands (commercial operations) showed the largest increase in tonnage, 702,200 tons or 24.8 percent, with an increase in value of 32.2 percent. Paving and highway-structures sand (commercial operations) showed the highest percentage increase over the previous year, a gain of 57.8 percent in amount and 77.7 percent in value.

Structural sands (government-and-contractor operations) and "other construction sands" increased in both quantity and value. Sand for all other uses showed decreases in amount and value from 1947, except natural-bonded molding sand which increased 1.3 percent in tonnage and declined 20.2 percent in value, an average of 46 cents per ton, from the previous year (table 42).

Gravel comprised 62 percent of the total quantity of "other sand and gravel" sold or used by producers in Illinois in 1948. It amounted to 9,353,300 tons and was valued at the pits at $6,059,400, showing an increase of 13 percent in amount and 25.8 percent in value over the previous year. Structural gravel (commercial operations) increased 11.2 percent in amount and 31.5 percent in value over 1947, and paving and highway-structures gravel (government-and-contractor operations) gained 34.4 percent in tonnage and 49.0 percent in value. Gravel for all other uses showed increases both in amount and value (table 42).

Total sand (including silica sand) and

TABLE 41.—SILICA SAND SOLD OR USED BY PRODUCERS IN ILLINOIS, 1947–1948[a]

Use	Type of operation	1947				1948				Percent change in amount from 1947
		Plants[b]	Amount tons	Value at plants		Plants[b]	Amount tons	Value at plants		
				Total	Av.			Total	Av.	
Industrial sands										
Glass sand	Commercial	5	1,180,526	$1,972,249	$1.67	4	981,483	$1,837,484	$1.87	−16.9
Steel molding sand	Commercial	12	999,814	1,439,096	1.44	14	1,192,700	1,978,784	1.66	+19.3
Blast, grinding and polishing sands	Commercial	3	119,464	439,258	3.68	3	126,987	498,568	3.93	+ 6.3
Engine and filter sands[c]	Commercial	2	41,513	93,628	2.25	2	42,770	106,710	2.49	+ 3.0
Other silica sand[d]	Commercial	3	166,240	362,345	2.18	4	143,332	339,907	2.37	−13.8
Total	Commercial	14	2,507,557	4,306,576	1.72	14	2,487,272	4,761,453	1.91	− 0.8
Construction sands										
Structural sands	Commercial	2	[e]26,216	[e]44,667	1.70	—	17,256	34,116	1.98	−34.2
Total silica sand	Commercial	14	2,533,773	$4,351,243	$1.72	14	2,504,528	$4,795,569	$1.91	− 1.2

[a] Summary of joint canvass made by Illinois Geological Survey and U. S. Bureau of Mines.
[b] Number of plants reporting production.
[c] Includes fire or furnace sand.
[d] Except sand ground for silica flour, which is given in table 43, "Ground Silica."
[e] Includes paving sands.

gravel amounted to 17,596,200 tons, valued at the plants at $14,988,700, an increase of 14.7 percent in amount and 22 percent in value over 1947. This exceeds in value the former high record established in the previous year when sand and gravel (including silica sand) sold or used by producers in Illinois were valued at $12,279,800.

Of the 224 commercial plants reporting on 1948 operations, 12 percent had discontinued business during the year, 2 percent had changed ownership, 14 percent were idle and 72 percent reported production. Ten new operations were listed.

Annual production and value of sand (including silica sand) and gravel in Illinois is shown graphically in figure 14 for each year since 1920. The average value per ton for each year is also given.

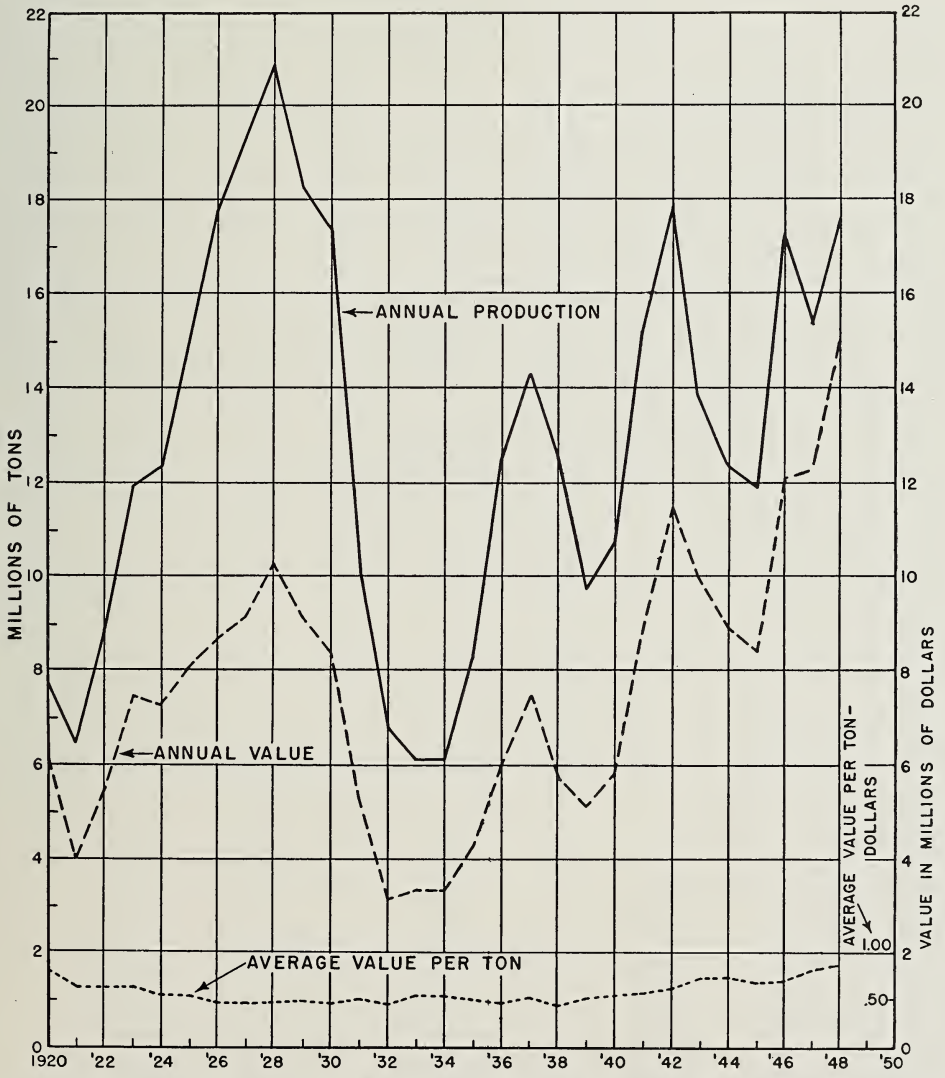

FIG. 14.—Annual production and value of sand (including silica sand) and gravel in Illinois, 1920-1948.

TABLE 42.—SAND (OTHER THAN SILICA SAND) AND GRAVEL SOLD OR USED BY PRODUCERS IN ILLINOIS, 1947–1948[a]

Kind and use	Type of operation	1947*				1948				Percent change in amount from 1947
		Plants[b]	Amount tons	Value at plants		Plants[b]	Amount tons	Value at plants		
				Total	Av.			Total	Av.	
Sand (other than silica sand)										
Industrial sands										
Natural-bonded molding sand	Commercial	10	118,365	$ 255,962	$2.16	8	119,865	$ 204,316	$1.70	+ 1.3
Engine sand	Commercial	13	147,149	100,925	.69	10	94,407	70,203	.74	− 35.8
Total	Commercial	19	265,514	356,887	1.34	16	214,272	274,519	1.28	− 19.3
Construction sands										
Structural sands[c]	Commercial	15	2,835,383	1,806,589	.64	62	3,537,619	2,388,164	.68	+ 24.8
Structural sands[c]	Gov.-contr.	1	270	216	.80	3	3,420	2,038	.60	+1166.7
Paving and highway-structures sand	Commercial	36	949,589	646,091	.68	38	1,498,907	1,148,117	.77	+ 57.8
Paving and highway-structures sand	Gov.-contr.	3	51,339	51,420	1.00	4	21,278	19,031	.89	− 58.6
Railroad-ballast sand	Commercial	4	244,723	103,876	.42	5	186,970	91,832	.49	− 23.6
Other construction sands	Commercial	11	188,798	145,127	.77	10	275,936	209,967	.76	+ 14.6
Total	Both	71	4,270,102	2,753,319	.64	86	5,524,130	3,859,149	.70	+ 29.4
Total sand (other than silica sand)	Commercial	77	4,484,007	3,058,570	.68	84	5,713,704	4,112,599	.72	+ 27.4
Total sand (other than silica sand)	Gov.-contr.	4	51,609	51,636	1.00	6	24,698	21,069	.85	− 52.1
Total sand (other than silica sand)	Both	81	4,535,616	3,110,206	.69	90	5,738,402	4,133,668	.72	+ 26.5
Gravel										
Structural gravel[c]	Commercial	63	2,823,525	1,788,385	.67	73	3,140,749	2,351,206	.75	+ 11.2
Structural gravel[c]	Gov.-contr.	4	55,385	18,308	.34	4	66,946	31,136	.47	+ 20.9
Paving and highway-structures gravel	Commercial	88	3,495,340	2,088,244	.60	94	3,773,023	2,426,561	.64	+ 7.9
Paving and highway-structures gravel	Gov.-contr.	31	616,485	365,209	.59	25	828,756	544,230	.66	+ 34.4
Railroad-ballast gravel	Commercial	13	1,184,994	503,260	.42	15	1,192,682	520,017	.44	+ .6
Other gravel	Commercial	13	99,412	54,993	.55	25	351,119	186,295	.53	+ 253.2
Total	Both	153	8,275,141	4,818,399	.58	163	9,353,275	6,059,445	.65	+ 13.0

Total gravel	Commercial	119	7,603,271	4,434,882	.58	136	8,457,573	5,484,079	.65	+ 11.2
Total gravel	Gov.-contr.	34	671,870	383,517	.57	27	895,702	575,366	.64	+ 33.3
Total gravel	Both	153	8,275,141	4,818,399	.58	163	9,353,275	6,059,445	.65	+ 13.0
Total sand (other than silica sand) and gravel	Commercial	136	12,087,278	7,493,452	.62	147	14,171,277	9,596,678	.68	+ 17.2
Total sand (other than silica sand) and gravel	Gov.-contr.	36	723,479	435,153	.60	31	920,400	596,435	.65	+ 27.2
Total sand (other than silica sand) and gravel	Both	172	12,810,757	7,928,605	.62	178	15,091,677	10,193,113	.68	+ 17.8
Summary—Sand (including silica sand) and gravel (Tables 41 and 42)										
Total industrial sands (including silica sand)	Both	37	2,773,071	4,663,463	1.68	30	2,701,544	5,035,972	1.86	− 2.6
Total construction sands and gravel	Both	162	12,571,459	7,616,385	.60	175	14,894,661	9,952,710	.67	+ 18.5
Total sand (including silica sand) and gravel (Tables 41 and 42)	Both	186	15,344,530	$12,279,848	$0.80	192	17,596,205	$14,988,682	$0.85	+ 14.7

* Revised figures.
[a] Sumary of joint canvass made by Illinois Geological Survey and U. S. Bureau of Mines.
[b] Number of plants reporting production.
[c] Excludes highway structures.

SILICA AND TRIPOLI

Ground Silica

Ground silica or silica flour is made by fine grinding of washed silica sand. During 1948 the quantity of this material sold or used by producers in Illinois amounted to 222,800 tons and was valued at the plants at $1,864,600, as shown in table 43. This was an increase of 17.7 percent in amount and 27.9 percent in value over the previous year, or a gain of 67 cents per ton. Illinois continued to rank first among the states in the production of ground silica. It is used in the abrasive, foundry, filler, ceramic, and other fields. In the ceramic industry it is known as "silica flour" or "potter's flint." The use of ground silica for abrasives comprised 40.8 percent of the total tonnage and 39.3 percent of the total value for 1948.

Tripoli ("Amorphous" Silica)

Tripoli ("amorphous" silica) is used as an abrasive, polish, filler, and for many other purposes. The amount and value of this material sold or used by producers in Illinois in 1948 are not available, but figures for 1944-1947 are given in table 44.

Table 44.—Tripoli ("Amorphous" Silica) Sold or Used by Producers in Illinois, 1944–1948[a]

Year	Amount tons	Value at plants		Percent change in amount from previous year
		Total	Average	
1944.....	12,031	$205,732	$17.02	+17.9
1945.....	11,144	184,189	16.53	− 7.4
1946.....	15,631	321,600	20.57	+40.3
1947.....	14,687	314,075	21.38	− 6.0
1948.....	(b)	(b)	—	—

[a] Summary of joint canvass made by Illinois Geological Survey and U. S. Bureau of Mines.
[b] Not available.

Table 43.—Ground Silica Sold or Used by Producers in Illinois, 1947–1948[a]

Use	1947			1948			
	Amount tons	Value at plants		Amount tons	Value at plants		Percent change in amount from 1947
		Total	Av.		Total	Av.	
Abrasive.....	75,485	$ 607,433	$8.04	90,969	$ 742,221	$8.16	+ 20.5
Enamel and glass.....	13,380	78,801	5.89	9,605	73,898	7.69	− 28.2
Foundry and filler.....	49,831	384,834	7.72	56,516	476,009	8.42	+ 13.4
Pottery, porcelain, and tile.....	35,378	274,374	7.76	14,751	121,028	8.20	− 58.3
Other uses and undistributed.....	15,182	112,189	7.39	50,986	451,429	8.85	+235.9
Total.....	189,256	$1,457,631	$7.70	222,827	$1,864,585	$8.37	+ 17.7

[a] Summary of joint canvass made by Illinois Geological Survey and U. S. Bureau of Mines.

FLUORSPAR INDUSTRY IN 1948

Production

United States production of fluorspar in 1948 was slightly less than in 1947, according to the U. S. Bureau of Mines. Total production in 1948 was 336,000 net tons, as compared with 343,700 tons in 1947 (table 45). Producing states in 1948 were Illinois, Kentucky, Arizona, Colorado, Montana, Nevada, and Utah. Commercial production in Montana was reported for the first time in the fourth quarter of 1948.

Imports

Fluorspar imports established an all-time high of 111,200 net tons in 1948 (table 46). This followed another decided increase in 1947 when imports advanced to 78,300 tons over the 1946 total of only 29,488 tons. Imports in 1948 came largely from Mexico, which furnished 79,406 tons of a total of 111,200 tons. Other imports came from Newfoundland, Spain, Italy, and Germany. The 1,379 tons from Germany

Table 45.—Salient Statistics of Finished Fluorspar in the United States, 1945–1948[a]
(In short tons)

Date	Production	Shipments from mines[b]	General imports (receipts)	Consumption	Industry stocks at end of period		
					Consumers' plants	Domestic mines	Total
1945	325,200	323,961	100,726	356,090	103,148	19,863	123,011
1946	277,300	277,940	29,488	303,190	98,663	18,957	117,620
1947	343,700	329,484	78,379	376,138	114,150	33,101	147,251
1948:							
First quarter	72,341	63,918	20,014	97,292	103,748	41,524	145,272
Second quarter	81,982	83,327	24,553	97,235	104,904	40,179	145,083
Third quarter	95,552	95,683	32,708	102,324	130,952	40,048	171,000
Fourth quarter	86,212	88,332	34,334	108,954	146,114	37,928	184,042
Total	336,087	331,260	111,609	405,805	—	—	—

[a] Source: U. S. Bureau of Mines.
[b] Comprises shipments to domestic and foreign consumers and to government strategic stock pile.

Table 46.—Imported Fluorspar Delivered to Consumers in the United States, by Uses, 1947–1948[a]

Use	1947			1948		
	Short tons	Selling price at tidewater, border, or f.o.b. mill in United States, including duty		Short tons	Selling price at tidewater, border, or f.o.b. mill in United States, including duty	
		Total	Av.		Total	Av.
Steel	64,797	$1,665,629	$25.71	98,671	$2,458,384	$24.91
Hydrofluoric acid	12,346	506,497	41.03	10,009	468,861	46.84
Ferro-alloys	229	7,900	34.50	265	6,201	23.40
Glass and enamel	495	21,902	44.25	227	11,478	50.56
Other	403	13,377	33.19	2,059	69,033	33.53
Total	78,270	$2,215,305	$28.30	111,231	$3,013,957	$27.10

[a] Source: U. S. Bureau of Mines.

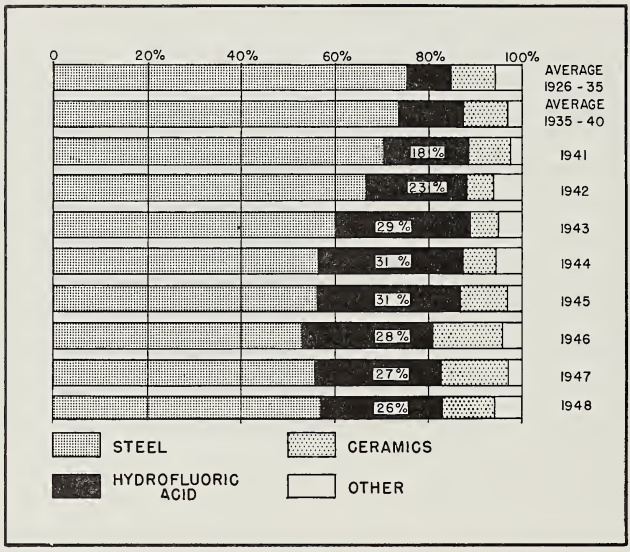

Fig. 15.—Percentage consumption of fluorspar (domestic and foreign) by industries, 1926-1948.

were the first imports of German spar since 1939.

Shipments

Total U. S. shipments from mines in 1948 amounted to 331,392 net tons, of which Illinois shipped 172,561 tons or 52 percent (table 47). Shipments by river or river-rail were 71,696 in 1948 as compared with 60,630 tons in 1947.

Consumption

Consumption of fluorspar in 1948 was 406,269 net tons, which record was surpassed only by the wartime consumption in 1944, when 410,170 tons were consumed in the United States. The 1947 consumption was 376,138 net tons. Both steel and hydrofluoric-acid industries used considerably more fluorspar in 1948 than in 1947, although the percentage increase was less

Table 47.—Fluorspar of Domestic Origin Shipped from Mines in the United States, by States, 1947–1948[a]

State	1947			1948		
	Short tons	Value		Short tons	Value	
		Total	Av.		Total	Av.
Colorado	32,153	$ 950,882	$29.57	27,698	$ 831,218	$30.01
Illinois	167,157	6,148,654	36.78	172,561	6,322,246	36.64
Kentucky	90,256	2,713,508	30.06	84,889	2,663,377	31.37
New Mexico	27,526	841,095	30.56	24,968	911,682	36.51
Arizona	1,601			1,271		
Nevada	8,042	300,736	24.27	9,615		
Texas	1,019			906	492,503	23.15
Utah	1,730			9,166		
Montana				318		
Total	329,484	$10,954,875	$33.25	331,392	$11,221,026	$33.86

[a] Source: U. S. Bureau of Mines.

than it had been in 1947 from the 1946 consumption. The steel industry showed a 36 percent increase during the two-year period, 1946 to 1948, and the hydrofluoric-acid industry a 23 percent increase during the same period (tables 48, 49, 50). Illinois continued to rank first as a consumer of fluorspar in hydrofluoric acid. The ceramic industry showed a very slight gain in consumption in enamel in 1948 but there was a sufficient decrease in glass to bring the total consumption in ceramics in 1948 below the 1947 figure (51,068 net tons in 1947 and 46,118 tons in 1948).

TABLE 48.—FLUORSPAR SHIPPED FROM MINES IN THE UNITED STATES, BY GRADES AND INDUSTRIES, 1947–1948[a]
(In net tons)

Grade and industry	1947	1948	Grade and industry	1947	1948
Fluxing gravel and foundry lump:			Acid lump:		
Ferrous	[b, c] 158,789	[b] 167,376	Nonferrous	1	1
Nonferrous	1,734	1,286			
Cement	812	950			
Miscellaneous	3,489	4,780			
Government stock pile	9,109	—	Total:		
			Ferrous	171,862	179,090
Total	[b, c] 173,933	[b] 174,392	Nonferrous	2,518	2,380
			Cement	812	950
			Glass and enamel	49,559	45,425
			Hydrofluoric acid	89,667	96,848
Ground and flotation concentrates:			Miscellaneous	4,777	6,105
			Government stock pile	9,109	—
Ferrous	[b, c, d] 13,073	[d] 11,714	Exported	1,180	594
Nonferrous	783	[d] 1,093			
Glass and enamel	49,559	45,425	Total	329,484	331,392
Hydrofluoric acid	89,667	96,848			
Miscellaneous	1,288	1,325			
Exported	1,180	594			
Total	[b, c, d] 155,550	156,999			

[a] Source: U. S. Bureau of Mines.
[b] Fluxing gravel includes (and flotation concentrates exclude) the following quantities of flotation concentrates blended with fluxing gravel: 1947, 19,110 tons; 1948, 16,666 tons.
[c] Revised figure.
[d] Includes pelletized gravel.

TABLE 49.—FLUORSPAR OF DOMESTIC ORIGIN SHIPPED FROM MINES IN THE UNITED STATES, BY USES, 1947–1948[a]

Use	1947			1948		
	Short tons	Value		Short tons	Value	
		Total	Av.		Total	Av.
Steel	165,427	$ 4,799,531	$29.01	170,276	$ 5,052,440	$29.67
Iron foundry	4,439	133,728	30.13	6,667	220,512	33.08
Glass	40,843	1,434,905	35.13	36,010	1,295,524	35.98
Enamel	8,716	315,491	36.20	9,415	362,111	38.46
Hydrofluoric acid	89,667	3,662,409	40.84	96,848	3,852,678	39.78
Miscellaneous	10,103	346,532	34.30	11,582	414,255	35.77
Government stockpile	9,109	218,600	24.00	—	—	—
Exported	1,180	43,679	37.02	594	23,506	39.57
Total	329,484	$10,954,875	$33.25	331,392	$11,221,026	$33.86

[a] Source: U. S. Bureau of Mines.

Table 50.—Consumption of Fluorspar (Domestic and Foreign) in the United States, by Industries, 1943–1948[a]
(In net tons)

Date	Steel	Hydro-fluoric acid	Glass	Enamel	All other	Total
1943	234,148	113,614	20,592	1,726	18,805	388,885
1944	230,201	129,553	27,315	2,547	20,554	410,170
1945	197,916	109,315	31,874	3,695	13,290	356,090
1946	160,735	83,901	39,852	6,739	11,963	303,190
1947	209,395	100,363	42,130	8,938	15,312	376,138
1948	232,687	107,280	37,247	8,871	20,184	406,269

[a] Source: U. S. Bureau of Mines.

Stocks

Stocks at consumers' plants and total stocks on hand were greater at the close of 1948 than at the close of 1947 (table 45). As far as is known to the public, the Federal government has not yet begun stock-piling fluorspar in its program of stock-piling strategic minerals, although the situation has been given consideration. Since Federal government stockpiles have not been listed by the Bureau of Mines since the close of 1946, we do not know how much, if any, is being held by the Office of Metals Reserve at the present time.

New Discoveries

New discoveries in 1948 of what appear to be rather extensive deposits of fluorspar have made the picture of reserves much brighter than it appeared to be a year ago. Development of these deposits may cause a decline in our imports of fluorspar, which have shown a steady increase during the past two years. This was believed expedient, if not actually essential, to national safety. Therefore it is possible that imports may be decreased somewhat in favor of domestic producers.

A vein of fluorspar described as one of the best found in the Illinois-Kentucky district in recent months was discovered in Pope County, Illinois, by a newly organized mining company, the PMT Co., which leased 40 acres in Pope County from the Hicks Creek Mining Corporation. Core drilling shows the vein to be 8 to 18 feet wide. Two shafts, one 125 feet deep and one 140 feet deep, have been sunk.

Deposits believed to be quite extensive have been discovered in Juab County, Utah. These chimney-like deposits are unique in the Western states because of their size and shape. The mineral found in this area is unusually high in CaF_2 content (at present running plus 85 percent CaF_2) and low in SiO_2 (less than 2 percent SiO_2). During the summer of 1948 approximately 100 railroad cars of ore of above 90 percent CaF_2 and less than 1 percent SiO_2 were shipped. The analysis for one car purchased by the Geneva Steel Co. at Provo was CaF_2 94.90 percent; SiO_2 0.44 percent; CaO 1.12 percent; MgO 0.32 percent; S 0.012 percent; H_2O 4.5 percent. By late September (1948) word of the rich discoveries had spread and prospectors began flocking to the area. More than a thousand claims have been located. Without exception the producing ore bodies are verticle chimneys. The future of the area depends upon the depth of these deposits, a question which probably cannot be answered for many years. However, the quality of surface deposits is high enough to attract buyers in spite of the distance from consuming areas.

Quoted Prices on Fluorspar, 1948[a]

Fluorspar, acid grade, bags, c.l., mines, ton	$47.50
l.c.l., mines, ton	49.50
bulk, contract, c.l., mines, ton	42.00
non-contract, c.l., mines, ton	45.00
l.c.l., mines, ton	47.00
ceramic grade, No. 1, ground, 90–92% CaF_2, bulk, c.l., mines, net ton	$39–41
Washed, gravel, 70% or more CaF_2, bulk, c.l., mines, ton	35–37
65%, bulk, c.l., mines, ton	34–36
60%, bulk, c.l., mines, ton	33–35
less than 60%, bulk, c.l., mines, ton	32–34

[a] Oil, Paint and Drug Reporter.

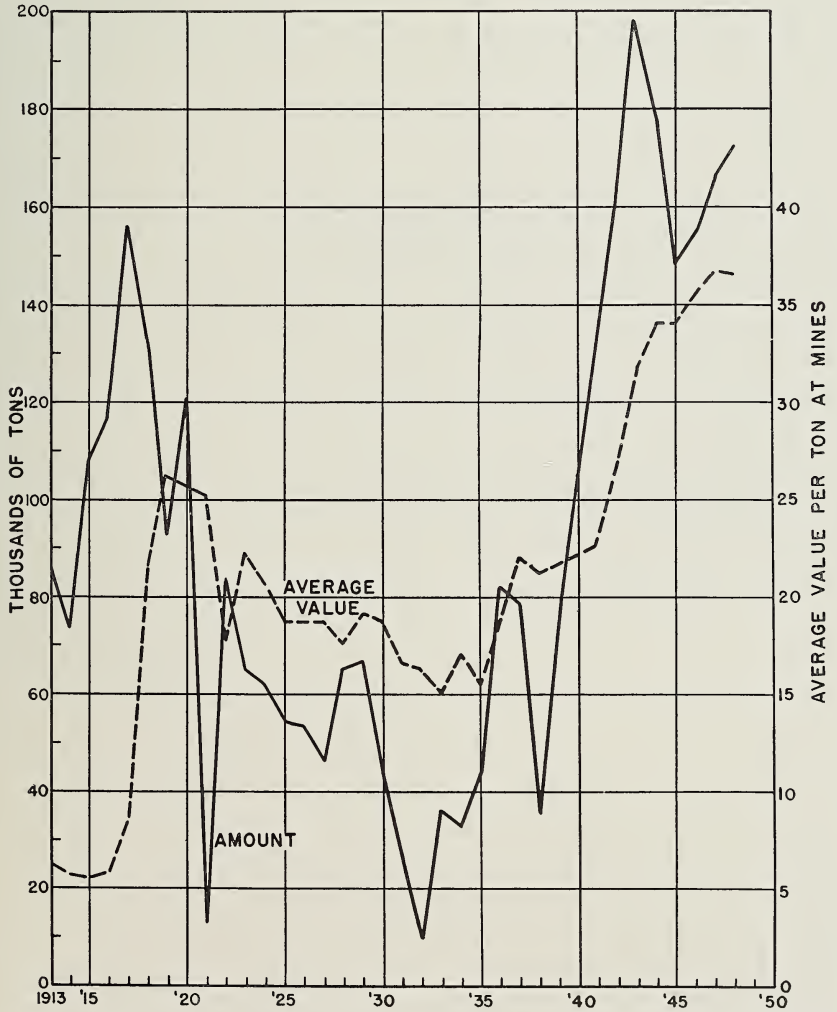

FIG. 16.—Fluorspar, annual shipments and average value, from Illinois mines, 1913-1948.

Fluorspar in Illinois

The average price of Illinois fluorspar shipped from mines decreased from $36.78 per ton in 1947 to $36.64 per ton in 1948, whereas the average price for the country as a whole increased from $33.25 per ton in 1947 to $33.86 in 1948.

As in 1947, Illinois production of fluorspar was approximately 51 percent of the national total. Total production in Illinois amounted to 169,757 tons in 1948. This figure is for cleaned and concentrated fluorspar recovered.

Shipments increased from 167,157 tons in 1947 to 172,561 tons in 1948. Dollar value increased from $6,148,654 in 1947 to $6,322,246 in 1948, in spite of the average price decrease.

Fluorspar consumption in Illinois increased from 59,646 tons in 1947 to 63,304 tons in 1948, with consumption in the production of hydrofluoric acid again ranking first in the country.

ZINC, LEAD, AND SILVER

In 1948 the Illinois mine production of zinc, lead, and silver, in terms of recoverable metals, established an all-time high in value. According to figures published by the U. S. Bureau of Mines, the value of these three metals totaled $4,779,153. This is an increase of 53.7 percent over the value of the 1947 production. Table 51 gives the production figures for zinc, lead, and silver for the years 1947 and 1948.

The production of these metals in southern Illinois and northern Illinois during 1948 was as follows: for zinc, the northern part of the state reported 6,197 tons as against 6,783 tons for the southern part; for lead, the southern portion of the state produced about three times (2,749 tons) more than the northern portion (946 tons); the entire reported production of silver (4,047 Troy oz.) in Illinois came from the southern part of the state.

Table 51.—Zinc, Lead, and Silver Recovered from Ores Mined in Illinois, 1947–1948[a]

Metal	Unit	1947*			1948			Percent change in amount from 1947
		Amount	Value		Amount	Value		
			Total	Av.		Total	Av.	
Zinc	Tons	10,073	$2,437,666	$242.00	12,980	$3,452,680	$266.00	+ 28.9
Lead	Tons	2,325	669,600	288.00	3,695	1,322,810	358.00	+ 58.9
Silver	Troy oz.	1,790	1,620	0.905	4,047	3,663	0.905	+126.1
Total		—	$3,108,886	—	—	$4,779,153	—	[b]+ 53.7

* Revised figures.
[a] Source: U. S. Bureau of Mines.
[b] Percent change in value from 1947.

MINERALS PROCESSED, BUT MOSTLY NOT MINED, IN ILLINOIS

Included in this group are mineral materials which are processed in Illinois, but mostly are mined in other states. The amount and value of these materials, sold or used by processors in Illinois for 1946-1948, are given in table 52, as far as the data are available.

Coke and by-products produced in Illinois are made in the by-product ovens, mostly from coal mined in the eastern bituminous fields. Coke produced from Illinois is not differentiated from the other, so table 52 gives the entire amount of coke made in Illinois. Details of coke products are given in this report in table 20.

Table 52.—Minerals Processed but Mostly not Mined

Kind	Unit	1946		
		Amount	Value at plants	
			Total	Av.
Coke produced and by-products sold	—	—	$ 40,443,313	$ —
Packaged fuel	Tons	1,454	23,814	16.38
Pig iron produced	"	4,357,310	117,647,370	27.00
Slab zinc	"	104,002	25,376,488	244.00
Total minerals processed, but mostly not mined, in Illinois	—	—	$183,490,985	—

[a] Source: U. S. Bureau of Mines except for pig iron.
Pig iron, American Iron and Steel Institute.
Pig iron prices, estimated by Geological Survey.
[b] Not available.

The packaged fuel industry produces 3- to 4-inch, more or less friable cubes wrapped (6 to 8 to a package) in sturdy paper, suitable for local consumption, but not as a rule for transportation over long distances.

Pig iron, a basic product in the steel industry, is produced in Illinois from iron ore mined in the Lake Superior district and shipped by water.

Slab zinc, a basic product in the zinc industry, is produced in Illinois from ores mined in Illinois and from ores mined in other states. Zinc recovered from Illinois and other ores is included in table 52.

IN ILLINOIS, SOLD OR USED BY PRODUCERS IN ILLINOIS, 1946–1948[a]

1947			1948			
Amount	Value at plants		Amount	Value at plants		Percent change in value from 1947
	Total	Av.		Total	Av.	
—	$ 59,908,055	$ —	—	$ 66,229,015	$ —	+10.5
(b)	(b)	—	(b)	(b)	—	—
5,600,152	196,005,320	35.00	5,512,783	231,536,886	42.00	+18.1
113,192	27,392,464	242.00	93,229	24,798,914	266.00	− 9.5
—	$283,305,839	—	—	$322,564,815	—	—

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